

PACIFIC SEABIRDS



A Publication of the Pacific Seabird Group

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2018

PACIFIC SEABIRD GROUP

Dedicated to the Study and Conservation of Pacific Seabirds and Their Environment

The Pacific Seabird Group (PSG) is a society of professional seabird researchers and managers dedicated to the study and conservation of seabirds. PSG was formed in 1972 out of a need for increased communication among academic and government seabird researchers. The principal goals of PSG are to (1) increase the quality and quantity of seabird research through facilitating exchange of information; (2) identify and assess the importance of threats to seabird populations; and (3) provide government agencies and others with expert advice on managing populations of seabirds. PSG is headed by an Executive Council composed of members volunteering their time. Members include biologists, wildlife managers, students, and conservationists from the United States, Mexico, Canada, Japan and 12 other countries. PSG annual meetings and publications provide forums where members can share their findings on all research topics relating to Pacific seabirds and discuss local and large scale conservation issues. Abstracts for meetings are published on our website. PSG publishes the on-line bulletin *Pacific Seabirds* (formerly the PSG Bulletin; www.pacificseabirdgroup.org) and the journal *Marine Ornithology* (www.marineornithology.org). Other publications include symposium volumes and technical reports; these are listed near the back of this issue. PSG is a member of the Ornithological Council and the American Bird Conservancy. Annual dues for membership are \$50 (individual); \$35 (student, undergraduate and graduate); and \$1,500 (Life Membership, payable in five \$300 installments). Dues are payable with a credit card online or by check to the Treasurer; see the PSG website or the Membership Information at the back of this issue.

Website

<http://www.pacificseabirdgroup.org>

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Pacific Seabirds

This on-line bulletin reports on the work and committee activities of the Pacific Seabird Group, conservation news, and other items of importance to conservation of seabirds in the Pacific Ocean. The bulletin is published twice-yearly on the PSG website and reports membership news and archives PSG activities. This issue provides current and recent seabird work to PSG members for 2018. Back issues of *Pacific Seabirds* are posted on the group's website.

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Marine Ornithology

Marine Ornithology is published by the Pacific Seabird Group on behalf of a consortium of seabird groups: African, Australasian, Dutch, Japanese, Pacific, and UK. The journal is published two times a year and publishes contributed papers, forum articles, and book, website and software reviews, on all aspects of marine ornithology worldwide. For details on submitting to the journal, please go to marineornithology.org.

Change of Address

Send changes of address to the PSG Membership Coordinator, **Emma Kelsey**, membership@pacificseabirdgroup.org

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REGIONAL REPORTS FOR 2018

Compiled by: Robb Kaler

Regional Reports summarize current and recent seabird work to PSG members. Regional Reports generally are organized by location of the work, not affiliation of the biologist. They should not be cited without permission of the researchers.

ALASKA & RUSSIA

Compiled by Marc Romano

ALASKA-WIDE

Ed Melvin (Washington Sea Grant), **Kim Dietrich** (Kim Dietrich Consulting), **Rob Suryan** (Oregon State University), and **Shannon Fitzgerald** (National Oceanic and Atmospheric Administration [NOAA] Alaska Fisheries Science Center) completed analyses and a manuscript that assessed long-term trends in seabird bycatch rates in Alaskan longline fisheries. They used 23 years of NOAA groundfish observer data to assess trends before and after the widespread adoption of streamer lines by the fleet. Use of streamer lines reduced seabird bycatch by 77%-90% over a 14-year period. Despite this overall success, the models identified significant increasing trends in seabird bycatch in two of four target fisheries since streamer lines were adopted. Furthermore, they found that relatively few vessels accounted for much of the seabird bycatch. Night setting significantly reduced overall seabird bycatch while increasing target fish catch, however, night setting increased bycatch of Northern Fulmars (*Fulmarus glacialis*), limiting its potential for use as a bycatch mitigation method in Alaska. The results demonstrate that successful seabird bycatch reduction requires: fishery specific solutions, strong industry support, constant vigilance in analysis and reporting of observer data, and continued outreach to fleets.

The PSG Aleutian Tern Technical Committee, with primary financial support from the National Fish and Wildlife Foundation, convened an Aleutian Tern Conservation Planning meeting in Anchorage, Alaska, 26-27 January. The meeting was facilitated by private consultant **Jan Caulfield**,

and statisticians **Trent McDonald** and **Jason Carlisle** (Western Ecosystems, Inc.). The overarching goal was to work towards methods for assessing statewide Aleutian Tern (*Onychoprion aleuticus*) population size and trend, with a specific focus on developing methods for estimating abundance at the local (i.e. colony) scale. Methods recommended as a result of this meeting, including ground-based visual counts, ground-based photos, aerial photos obtained through drones, and acoustic recordings, were then pilot tested at multiple study sites in Alaska (including Kenai National Wildlife Refuge, Homer area, Kodiak National Wildlife Refuge, Yakutat Forelands, and Dillingham). Data are being analyzed with follow-up work to refine the techniques anticipated for the 2019 field season.

The work of the Smithsonian Migratory Bird Center's Migratory Connectivity Project continued in Alaska during June and July this year. **Autumn-Lynn Harrison** recovered 6 of 23 geolocators deployed in 2017 from Arctic Terns (*Sterna paradisaea*) on Alaska's north slope at the ConocoPhillips Alpine Camp. One breeding area from 2017 was largely still ice covered in late June and did not contain Arctic Tern nests this year. **Autumn-Lynn** also continued a migration study on Long-tailed Jaegers (*Stercorarius longicaudus*), this year working with **Laura Phillips** and **Emily Williams** in Denali National Park where six 5-g satellite tags were deployed. Two additional tags were deployed on the north slope at the ConocoPhillips Alpine Camp. All eight tags are still transmitting with current locations in Mexico, off-shore Costa Rica, Peru, Chile, and the high seas. **Autumn-Lynn** was assisted in the field by **Melinda Fowler** (Springfield College) and **Ellie Heywood** (Duke University).

ALASKA PENINSULA

Annual seabird monitoring at Chowiet Island (Semidis group, off the coast of the Alaska Peninsula) was led by **Nora Rojek** (Alaska Maritime National Wildlife Refuge) with summer-long field crews consisting of **Brendan Higgins** and **Jillian Soller**. They collected productivity, diet and population data on a variety of species including Common and Thick-billed Murres (*Uria aalge* and *U. lomvia*), Rhinoceros and Parakeet Auklets (*Cerorhinca monocerata* and *Aethia psittacula*), Horned and Tufted Puffins (*Fratercula corniculata* and *F. cirrhata*), Black-legged Kittiwakes (*Rissa tridactyla*), Glaucous-winged Gulls (*Larus glaucescens*), and Northern Fulmars (*Fulmarus glacialis*).

ALEUTIAN ISLANDS

Annual seabird monitoring at Buldir and Aiktak islands was led by **Nora Rojek** (U.S. Fish and Wildlife Service [USFWS] Alaska Maritime National Wildlife Refuge [AMNWR]) with summer-long field crews consisting of **Kevin Pietrzak**, **McKenzie Mudge**, and **Briana Bode** on Buldir. They collected productivity, diet and population data on a variety of species including Common and Thick-billed Murres (*Uria aalge* and *U. lomvia*); Parakeet, Least, Whiskered, and Crested Auklets (*Aethia psittacula*, *A. pusilla*, *A. pygmaea*, and *A. cristatella*, respectively); Horned and Tufted Puffins (*Fratercula corniculata* and *F. cirrhata*); Black-legged and Red-legged Kittiwakes (*Rissa tridactyla* and *R. brevirostris*); and Fork-tailed and Leach's Storm-petrels (*Oceanodroma furcata* and *O. leucorhoa*). **Sarah Youngren** and **Dan Rapp** (USFWS AMNWR) on Aiktak monitored Common and Thick-billed Murres; Ancient Murrelets (*Synthliboramphus antiquus*); Horned and Tufted Puffins; Glaucous-winged Gulls (*Larus*

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Sarah Youngren and Dan Rapp monitoring Glaucous-winged Gulls on Aiktak Island. Photo credit: Sarah Yougren via Marc Romano

glaucescens); Fork-tailed and Leach's Storm-petrels; and Double-crested, Red-faced, and Pelagic Cormorants (*Phalacrocorax pelagicus*, *P. urile*, and *P. auritus*).

Aaron Christ (USFWS AMNWR) tested a new method for monitoring Tufted Puffin populations at Egg, Poa, and Kaligagan islands in late August. Work was conducted off the R/V *Tiglax* with the help of **Briana Bode**, **Sarah Youngren**, and **Daniel Rapp** (USFWS AMNWR).

BERING AND CHUKCHI SEAS

Annual seabird monitoring at St. Paul and St. George islands was led by **Marc Romano** (U.S. Fish and Wildlife Service [USFWS] Alaska Maritime National Wildlife Refuge [AMNWR]) with summer-long field crews consisting of **Ryan Mong** and **Sarah Tanedo** (St. Paul), and **Laney White**, **Sarah Guitart**, and **Shannon Carvey** (St. George). Both crews collected data on a variety of species including Red-faced Cormorants (*Phalacrocorax urile*), Common Murres (*Uria aalge*), Thick-billed Murres (*Uria lomvia*), Least Auklets (*Aethia pusilla*), Black-legged Kittiwakes (*Rissa tridactyla*), and Red-legged Kittiwakes (*Rissa brevirostris*). The crews collected productivity, diet, adult survival and population data. In

addition, a survey team conducting other Refuge work (passerine and shorebird surveys) made observations of seabirds on St. Matthew and Hall islands. This crew consisted of **Marc Romano**, **Jim Johnson**, **Stephanie Walden**, **Bryce Robinson**, **Tony DeGange**, **Ryan Mong**, **Sarah Tanedo** (all USFWS), **Steve Matsuoka**, **Bob Gill**, and **Rachael Richardson** (U.S. Geological Survey). This work was supported by the Alaska Maritime National Wildlife Refuge vessel R/V *Tiglax*.

R/V *Tiglax* made its first voyage to the Chukchi Sea in 30 years. An Alaska Maritime National Wildlife Refuge crew consisting of **Marianne Aplin**, **Aaron Christ**, **Don Dragoo**, **Heather Renner**, **Nora Rojek**, **Jeff Williams**, and **Kara Zwickey** cruised from Nome to the seabird colonies at capes Thompson, Lisburne, and Lewis to assess the current condition of plots and observation points that were established in the past (some as early as 1959), and count birds on the plots where possible: Common and Thick-billed Murres, Black-legged Kittiwakes, and Pelagic Cormorants (*Phalacrocorax pelagicus*). The crew also visited the Chamisso islands group (in Kotzebue Sound), as well as Sledge Island and Topkok Head (both located in Norton Sound).

Endangered species biologist **Kelly**

Nesvacil (Alaska Department of Fish and Game) and Assistant Professor - Senior Research **Don Lyons** (Oregon State University), with support from the National Fish and Wildlife Foundation, deployed Platform Transmitting Terminal (PTT) tags on Aleutian Terns (*Onychoprion aleuticus*) in Dillingham in June 2018. Movement to previously undocumented colonies and known colonies occurred, with breeding success confirmed at all colonies. Data are being analyzed in conjunction with a coordinated deployment in Yakutat.

Kathy Kuletz and **Liz Labunski** (USFWS) completed another year of offshore seabird surveys (now spanning 2006 – 2018) in the Bering, Chukchi, and Beaufort seas, under an Interagency Agreement with the Bureau of Ocean Energy Management (BOEM). This program relies on collaborations with oceanographic and fisheries research projects, which in 2018 included projects led by the University of Alaska Fairbanks, Hokkaido University, Environment Canada, Woods Hole Oceanographic Institute, the National Oceanic and Atmospheric Administration, and the Arctic Integrated Ecosystem Research Program Phase II, funded by the North Pacific Research Board and BOEM. In 2018, seabird observers were placed on eight research cruises from June to mid-November. The 2018 seabird observers for Bering/Arctic surveys were **Kathy Kuletz**, **Liz Labunski**, **Zak Polen**, **Martin Reedy**, **Charlie Wright**, and **Linnaea Wright**. Biologists with the Alaska Maritime National Wildlife Refuge also contributed survey data from their transits to remote colony sites in the northern Gulf of Alaska, and Bering Sea. Data will be archived in the North Pacific Pelagic Seabird Database.

In March 2018, **Kathy Kuletz** participated in the Circumpolar Seabird Group (an Arctic Council Expert Network), meeting in Cambridge, United Kingdom. **Kathy** and **Mark Mallory** also assisted with the seabird section write-up for the International Council for the Exploration of the Seas Protection of

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the Arctic Marine Environment (ICES/PAME) Working Group for the Central Arctic Ocean Assessment, with a draft to be submitted in October 2018. **Dan Cushing** (Pole Star Ecological Research LLC) produced seabird distribution maps and preliminary analyses for the report, using the USFWS at-sea survey data. **Carina Gjerdrum** (Canadian Wildlife Service) provided similar maps for the Atlantic Arctic and adjacent seas in Canadian waters.

During May to September 2018, the U.S. Fish and Wildlife Service Alaska Region received reports of higher than normal dead and dying seabirds from the Bering and Chukchi regions. Specifically, **Gay Sheffield** (Alaska SeaGrant), **Brandon Ahmasuk** (Kawerak, Inc.), **Stacia Backensto** and **Heather Coletti** (National Park Service), along with local community members, collected reports of seabird carcasses observed from Point Hope south to Bristol Bay, with highest onshore counts recorded near Nome and St. Lawrence Island. Federal, state, and local agencies as well as the Coastal Observation and Seabird Survey Team collaborated to collect information, synthesize records, and send carcasses for necropsies and disease testing to the U.S. Geological Survey National Wildlife Health Center and to the U.S. Geological Survey Alaska Science Center for harmful algal bloom analysis. Results indicate that birds died of starvation; however, results from saxitoxin analyses are pending.

GULF OF ALASKA

At East Amatuli Island, **Arthur Kettle** (U.S. Fish and Wildlife Service [USFWS] Alaska Maritime National Wildlife Refuge [AMNWR]) installed time-lapse cameras for season-long monitoring of Black-legged Kittiwake (*Rissa tridactyla*) and Common Murre (*Uria aalge*) breeding success. In August, he, **Kelby Leary**, and **Aimee Von Tatenhove** (USFWS AMNWR) surveyed monitoring plots of Fork-tailed Storm-Petrels (*Oceanodroma furcata*) and Tufted Puffins (*Fratercula cirrhata*).

Brie Drummond (USFWS AMNWR)

led annual seabird monitoring for the Alaska Maritime National Wildlife Refuge at St. Lazaria Island in southeast Alaska. The summer-long crew of **Stacie Evans** and **Daniel Schultz** collected productivity, population, and diet data on Common and Thick-billed Murres (*Uria lomvia*), Rhinoceros Auklets (*Cerorhinca monocerata*), Tufted Puffins, Black Oystercatchers (*Haematopus bachmani*), Glaucous-winged Gulls (*Larus glaucescens*), Fork-tailed and Leach's Storm-petrels (*Oceanodroma leucorhoa*), and Pelagic Cormorants (*Phalacrocorax pelagicus*).

The USFWS sponsored a research cruise aboard the R/V *Tiglax* in order to conduct seabird surveys along the outer coast of the Kenai Peninsula. **Heather Renner**, **Mariane Aplin**, **Arthur Kettle**, **Steve Delehanty**, **Marc Romano**, **Elizabeth Kandror**, and **Jeff Williams** (USFWS AMNWR), worked with partners **Sharon Kim** and **Shauna Potocky** (National Park Service, Kenai Fjords National Park), and **Tuula Hollmen**, **Amy Bishop** and **Tara Riemer** (Alaska SeaLife Center) to survey refuge lands in the Pye and Chiswell island groups.

In summer 2018, biologists from ABR, Inc. returned to lower Cook Inlet, Alaska after a 5-year hiatus to conduct surveys of marine birds and mammals in Kamishak Bay. Opportunistic surveys were conducted by **Adrian Gall** and **Pam Seiser** as they rode along with a team that was sampling nearshore fish communities for 4 days each month from March to July 2018. They recorded observations from the bridge of the 60-foot research vessel during transits between Homer and Kamishak Bay, and from 16-foot inflatable skiffs following the shoreline. The monthly trips documented the shift of the marine bird community from one dominated by large rafts of seaducks (e.g., Long-tailed Ducks [*Clangula hyemalis*]; White-winged [*Melanitta deglandi*] and Black Scotters [*M. americana*]) in winter to one dominated by small aggregations of Glaucous-winged Gulls in the summer. The most unusual observations were

those of struggling, starving, and dead Northern Fulmars (*Fulmarus glacialis*) and Fork-tailed Storm-petrels during early July. Flocks of 5–20 individuals gathered off the stern of the vessel and were found floating dying and dead when the crew made transits to shore for beach seining. The teams on shore found fulmar and storm-petrel carcasses tumbled in the wrack lines. Crews working in Iliamna Lake found 3 dead Fork-tailed Storm-petrels at one of their sites ~70 km from the marine coast. They collected 2 storm-petrel carcasses from marine waters and delivered them to the Alaska Maritime Wildlife Refuge office in Homer, Alaska.

In cooperation with Alaska Department of Fish and Game and other researchers, wildlife biologist **Robin Corcoran** and seabird monitoring technician **Jill Tengeres** (USFWS, Kodiak National Wildlife Refuge) continued to monitor nesting terns throughout the Kodiak Archipelago in hopes of determining reasons for declines in populations of both species throughout coastal Alaska. During the 2018 breeding season, they collected count data for terns at 30 of the 53 known colony sites in the archipelago and searched for new colonies. Aleutian Terns (*Onychoprion aleuticus*) were observed at 13 colonies and Arctic Terns (*Sterna paradisaea*) at 26 colonies. Trail cameras were placed on 51 nests of Aleutian Terns and 9 Arctic Tern nests to determine nest survival rates, causes of nest failure, and information on prey types being provided to chicks. In addition they collected 555 acoustic (sound) recording days across 11 sites, and surveyed 152 habitat plots (at 61 Aleutian Tern nests, 11 Arctic Tern nests, six Mew Gull [*Larus canus*] nests, and 74 associated random plots) at eight colonies. Three tern colonies in the Kodiak Archipelago were also chosen to pilot test new methods to estimate tern abundance. Along with Aleutian Tern colonies in Yakutat and Dillingham, the Kodiak colonies were surveyed using four methods: (1) optical ground-based counts (standard method),

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(2) ground-based photo counts, (3) low altitude photography using unmanned aerial vehicles (UAVs), and (4) acoustic recording devices. The ultimate goal is to improve tern colony monitoring in order to develop spatial and temporal sampling methods that will enable us to expand estimates from monitored colonies to the entire state.

Wildlife biologist **Melissa Gabrielson** and Prince William Sound Zone Terrestrial Program Manager **Erin Cooper** (U.S. Forest Service, Chugach National Forest), with support from interns **Hillary Chavez** (Environment for the Americas) and **Nathan Boma** (Ducks Unlimited), and additional financial support from the National Fish and Wildlife Foundation, monitored Aleutian Tern colonies on the Copper River Delta through aerial and ground based surveys. An aerial survey in May included the entire east and west Delta from the Eyak River to Controller Bay. Approximately 10 different congregations totaling approximately 162 terns were observed during the survey, with follow-up ground based surveys in June which documented an additional small colony (mixed with Arctic Terns).

Mike Gerringer, Trent McDonald (Western Ecosystems, Inc.), **Mark Laker** (USFWS, Kenai National Wildlife Refuge), and **Martin Renner** (Tern Again Consulting) collaborated in a survey methods development project and collected unmanned aircraft systems (UAS, aka drones) imagery of colonies near Soldotna and on Kodiak Island. **Martin** also conducted UAS surveys of the colony near Homer.

Martin Renner collected diet data from Aleutian Terns by photographing bill loads carried by adults feeding young. Several targeted colonies failed to produce young, but bill load data were obtained on Kodiak Island and in Naknek, Bristol Bay. In addition, he deployed an acoustic monitor at the Homer colony in early May prior to tern arrival. Terns were seen at the colony in late May, but unfortunately had abandoned by mid-June.



Kevin Pietrzak and McKenzie Mudge on Buildir Island. Photo credit: Stephanie Walden via Marc Romano

Mayumi Arimitsu, Sarah Schoen, Caitlin Marsteller, Gary Drew, and John Piatt (U.S. Geological Survey [USGS]) completed the third year of field work for their Status and Trends of Seabirds and Forage Fish in Lower Cook Inlet project. This project is funded by the USGS-Outer Continental Shelf program, and includes studies of oceanography, phytoplankton, zooplankton, forage fish, and seabirds (Common Murre and Black-legged Kittiwake) at and adjacent to two seabird colonies in lower Cook Inlet (Chisik and Gull islands). A recent USGS Annual Report (Arimitsu et al. 2018. Status of Forage Fish and Seabirds in Lower Cook Inlet During Summer, 2017) is available on request.

Seabird research and monitoring continued on Middleton Island in 2018 and was conducted by an international team from Canada, France, and the United States. The work was overseen by **Kyle Elliott** (McGill University), **Sarah Leclaire** (National Center for Scientific Research, Toulouse, France), **Morgan Benowitz-Fredericks** (Bucknell University), and **Scott Hatch** (Institute for Seabird Research and Conservation). **Scott** and **Martha Hatch**, joined by **Shawn** and **Kelly Pummill**, opened the season in early April for spring cleaning, facility

maintenance, and camp set-up. The core research team—**Kyle, Sarah, Morgan**, camp leader **Shannon Whelan**, **Alice Sun**, **Paige Caine**, **Maxime Pineaux**, **Eléonore Lefebvre**, **Tony Rinaud**, **Célia Maillette**, **Hannes Schraft**, **Luis Ramos**, and **Alyssa Piauwasyd** arrived at intervals from early May through June and continued the work through 15 August. **Mary Anne Bishop** of the Prince William Sound Science Center (PWSSC) sent two researchers, **Kristen Gorman** and **Anne Schaefer**, to Middleton for several weeks in July and August for telemetry studies of Tufted Puffins. The 2018 season was notable for seeing a partial amelioration of the unusually warm ocean conditions that have affected the northern Gulf of Alaska for the past several years. The influence of this warm-water event still lingers, however, and it is unclear whether it will continue to abate, or possibly make a resurgence over the coming months and years.

One of the few long-term marine monitoring programs in Alaska, the ‘Seward Line’ (primarily for oceanography and zooplankton, led by **Russ Hopcroft** of the University of Alaska Fairbanks) has conducted spring and fall cruises for 20 years, with the USFWS seabird team involved since 2006. In 2018, the Seward Line project

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expanded spatially and to three seasons as a ‘Long Term Ecosystem Research’ (LTER) study site with funding to UAF from the National Science Foundation. **Kathy Kuletz** and **Liz Labunski** (USFWS) worked with **Dan Cushing** (Pole Star Ecological Research LLC), to conduct offshore seabird surveys and analyses as part of the newly established Northern Gulf of Alaska LTER; this is one of 30 LTER sites in the U.S. and territories.

SOUTHEAST ALASKA

Susan Oehlers (U.S. Forest Service, Tongass National Forest) and intern **Janelle Lopez** (Student Conservation Association), with support from the National Fish and Wildlife Foundation, monitored Aleutian and Arctic Tern (*Onychoprion aleuticus* and *Sterna paradisaea*) colonies on the Yakutat forelands, including visual surveys to estimate abundance and deployment of remote cameras to monitor nest survival and incubation behavior. Assistant Professor - Senior Research **Don Lyons** (Oregon State University) with support from **Susan Oehlers** and **Janelle Lopez**, biologist **Nate Catterson** (U.S. Forest Service, Tongass National Forest), Professor and Director of Pacific Cooperative Studies **David Duffy** (University of Hawaii-Manoa), Regional Planner and Inventory & Monitoring Coordinator **Mike Goldstein** (U.S. Forest Service, Alaska Regional Office), and Associate Professor, Environmental Science & Geography Programs **Sanjay Pyare** (University of Alaska Southeast, Spatial Ecosystem Analysis Lab-SEALAB), deployed six 2-g solar Platform Transmitting Terminal (PTT) tags on Aleutian Terns on Black Sand Spit in the Yakutat area during May. Methods developed during the Aleutian Tern Conservation Planning meeting (see statewide summary), were pilot tested on Yakutat area colonies, including acoustic monitoring (led by **Susan** and **Janelle**) ground-based photos (led by **Sanjay Pyare** and research analyst **John Skinner**, Alaska Department of Fish and Game) and

aerial surveys via unmanned aerial vehicles (UAVs, aka drones) led by **Mike Gerringer** (Western Ecosystems Inc.), with support by others previously listed.

Wildlife technician **Gwen Baluss** (U.S. Forest Service, Tongass National Forest) and intern **Allan Saylor** (Student Conservation Association), with support from the Juneau Ranger District (JRD), Tongass National Forest, monitored Arctic Tern colonies at Mendenhall Lake, near Juneau, AK. Visual counts were used to estimate abundance. Remote camera systems were tested to monitor nests, determine the level of human disturbance, and identify predators. The lake was occupied by an estimated 50 terns and no chicks survived to fledging. The most important nest predator was wolf (*Canis lupus*). Data on these seabird colonies has been compiled by JRD since 2003. Nesting gulls are also counted annually; the current estimate is at least 300 each Glaucous-winged Gull (*Larus glaucescens*) and Herring Gull (*L. argentatus*), plus 12 Mew Gulls (*L. canus*).

RUSSIA

Heather Renner (U.S. Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge), **Daniel Roby** (Oregon State University), and **Don Lyons** (U.S. Geological Survey-Oregon Cooperative Fish & Wildlife Research Unit), with support from the U.S. Geological Survey Science Support Partnership Project, implemented the project “Survey and assessment of large Aleutian Tern (*Onychoprion aleuticus*) colonies in northern Sakhalin, Russia.” Project objectives were to (1) conduct surveys at key Aleutian Tern colonies within Russia to improve our understanding of current population status and trends there, (2) get first-hand experience of those colonies and see if/how they may differ compared to Alaskan colonies, and (3) promote greater communication and exchange of information and survey techniques between Russian and American experts. During 20–27 June, **Heather, Don,**

and **Martin Renner** (Tern Again Consulting) visited three major island colonies on the northeast coast of Sakhalin Island, and conducted surveys with the participation and support of **Zoya Reviakina** and **Vladimir Zykov** (Fauna Information and Research Center LTD), and **Larisa Zelenskaya** and **Pavel Ktitorov** (Far East Branch of the Russian Academy of Sciences). They assessed colony size using counts of flushed individuals, the size and density of nesting areas, and aerial imagery obtained using drones. The observed numbers were less than previously reported, however analyses of aerial imagery to confirm this conclusion is ongoing, and other mitigating factors are being considered. Short and long-term actions have been identified to maintain engagement between Russian and American experts and to improve population assessments across the entire species range, and a number of additional actions and products will be developed subsequent to the preliminary project report and trip summary.

WASHINGTON & OREGON

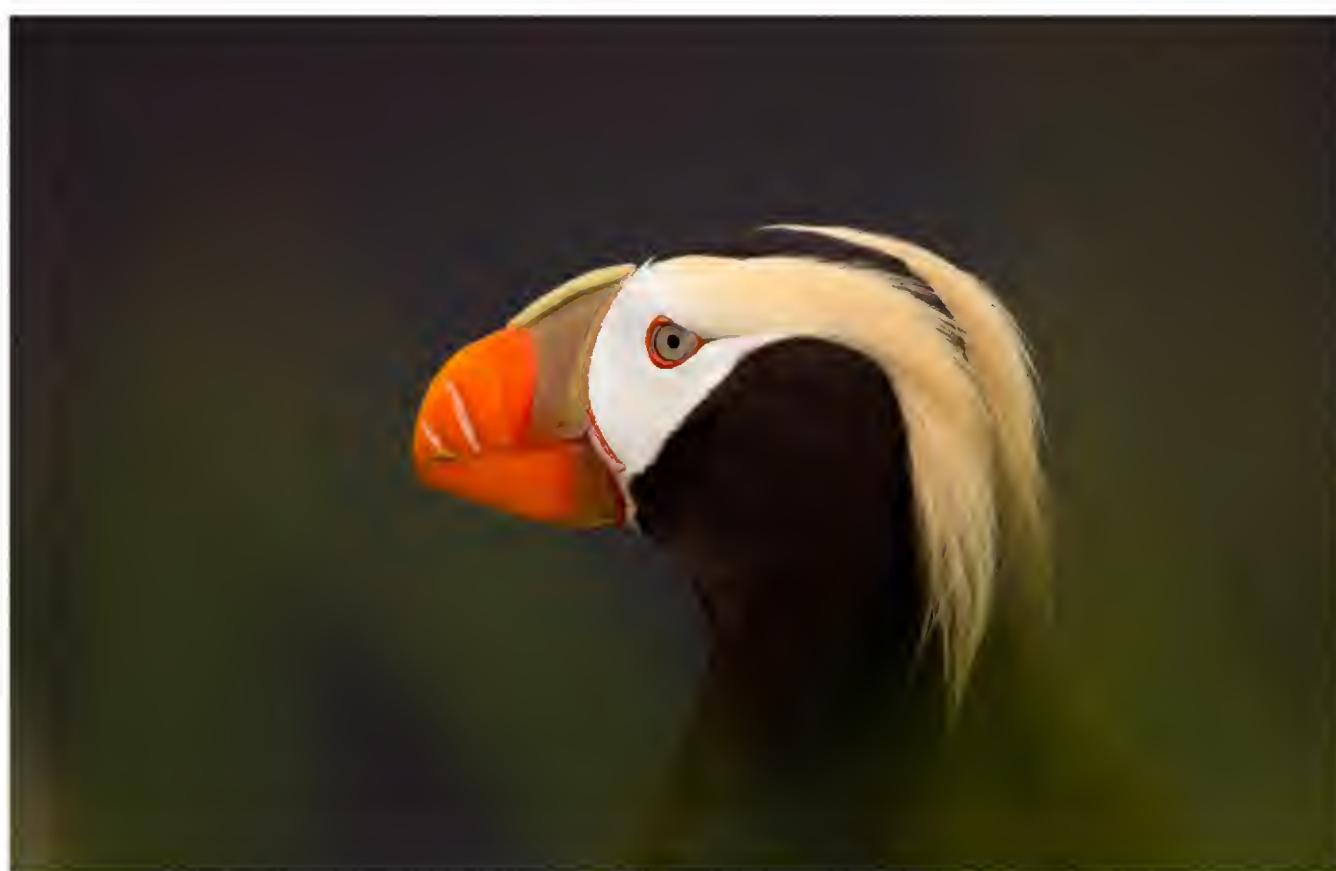
Compiled by Peter Hodum

WASHINGTON

Elizabeth Phillips completed her PhD in the School of Aquatic and Fishery Sciences at the University of Washington in June 2018. Her dissertation examined the influence of the Columbia River plume on Sooty Shearwater (*Puffinus griseus*) and Common Murre (*Uria aalge*) movement and foraging ecology. She is now beginning a post-doc with the National Research Council Research Associateship Program, based at the National Oceanic and Atmospheric Administration (NOAA) Northwest Fisheries Science Center in Seattle. She is working with **Dr. Sandy Parker-Stetter** to quantify the spatiotemporal distribution, abundance, and drivers of euphausiid variability in the California Current Ecosystem.

In spring 2016, **Jason Jannot, Tom**

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Tufted Puffin. Photo credit: Michael Johns

Good, and **Vanessa Tuttle** of the NOAA Fisheries Northwest Fisheries Science Center initiated an at-sea research project to determine the risk of seabird mortality from cables on fishing vessels using trawl gear in the at-sea Pacific hake (*Merluccius productus*) catcher processor fleet fishing off the U.S. Pacific coasts of Washington and Oregon. Working with **Amanda Gladics** of Oregon State University Oregon Sea Grant, the goals of this project are to systematically quantify the magnitude of seabird cable strikes and to develop methods to improve fleet-wide estimates of seabird mortality in this fishery. This work, in collaboration with the fishing industry, should also lead to bycatch mitigation strategies specifically designed to reduce seabird cable strikes. Results from 2016 and 2017 were presented at the 45th Annual Meeting of the Pacific Seabird Group in La Paz, Mexico.

Jason Jannot, Tom Good, Vanessa Tuttle, Anne Marie Eich, and Shannon Fitzgerald (NOAA) held a seabird cable strike mitigation workshop on 7-8 November 2017 in Seattle, WA. This workshop summarized seabird bycatch and mitigation in trawl fisheries off the coasts of Alaska, Washington, and Oregon. The goals of the workshop were to 1) bring together industry,

government, and non-governmental organization (NGO) representatives to share information on the scope and scale of seabird interactions with trawl vessels and 2) identify effective, practical mitigation measures to reduce seabird cable strike mortality in the catcher-processor U.S. west coast Pacific hake and Alaska trawl fisheries. Workshop attendees included 39 representatives of the groundfish trawl fishing industry, seafood associations, NGOs, and federal agencies from Alaska, Washington, and Oregon. A 2018 NOAA Technical Memorandum describes the workshop outcomes. (Jannot, J. E., T. Good, V. Tuttle, A. M. Eich, and S. Fitzgerald, editors. 2018. U.S. West Coast and Alaska Trawl Fisheries Seabird Cable Strike Mitigation Workshop, November 2017: Summary Report. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-142 https://www.nwfsc.noaa.gov/assets/25/9298_05312018_084659_TechMemo142.pdf)

Scott Pearson (Washington Department of Fish and Wildlife), **Tom Good** (NOAA Northwest Fisheries Science Center), and **Peter Hodum** (University of Puget Sound and Oikos) continued their long-term study of reproductive success patterns of Rhinoceros Auklets (*Cerorhinca*

monocerata) on Protection (twelfth year) and Destruction (tenth year) islands, Washington. Preliminary analyses of burrow occupancy and fledging success suggest that occupancy was comparable to long-term averages on Destruction but slightly lower on Protection, possibly the result of an ongoing impact of the adult mass mortality event that occurred during the 2016 breeding season. Fledging success on both islands was comparable to long-term averages. Dietary studies were conducted during the early and late chick-rearing stages on both islands, with diet composition on both islands similar to previous years. In addition to the Rhinoceros Auklet study, they also continued their conservation research program on Tufted Puffins (*Fratercula cirrhata*), focusing on mapping of active breeding burrows on Smith and Destruction islands and breeding season monitoring and foraging ecology of puffins on Destruction Island.

OREGON

Shawn Stephensen and **Lila Bowen** of the Oregon Coast National Wildlife Refuge Complex conducted an aerial seabird colony survey on 2 and 3 July 2018 that included the entire Oregon coast. The aircraft used was a Bell Jet Ranger III helicopter operated by **Doug Uttecht** of Northwest Helicopters (Olympia, WA). Total flight time was approximately 10 hours. All Common Murre (*Uria aalge*), Brandt's Cormorant (*Phalacrocorax penicillatus*), Pelagic Cormorant (*Phalacrocorax pelagicus*), and Double-crested Cormorant (*Phalacrocorax auritus*) colonies were photographed using digital cameras and birds were counted on the digital images using GIS computer software. Thousands of digital images were organized and archived for future reference. Colony attendance by murres appeared to be at normal levels in comparison to previous years.

Tim Halloran (U.S. Fish and Wildlife Service [USFWS] volunteer) and **Shawn Stephensen** conducted a population status assessment of Tufted

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Puffin (*Fratercula cirrhata*) at Haystack Rock, Cannon Beach which is within the Oregon Islands National Wildlife Refuge. The project also included a pilot study to evaluate the feasibility of monitoring additional reproductive parameters at the island, such as breeding phenology and data collection success from shore-based vantage points. The number of Tufted Puffins present at Haystack Rock was documented during 2010 - 2018 by conducting instantaneous counts of birds on the land, water, and in the air at 15 minute intervals. The daily mean counts were 42, 33, 13, 35, 22, 21, and 23 birds during 2010, 2011, 2012, 2013, 2014, 2015, and 2016 respectively. Burrow occupancy was determined and the annual breeding population estimate was calculated based on the number of viable occupied burrows. The Tufted Puffin breeding population (individual birds) at Haystack Rock was estimated to be 127 in 2010, 115 in 2011, 92 in 2012, 143 in 2013, 125 in 2014, 121 in 2015, and 124 in 2016. Data analysis has not been completed for 2017 and 2018, however, initial data review indicates 40 to 50 puffins appear to have nested. Many negative interactions with gulls and disturbances by eagles were also documented, in addition to interesting social behaviors between puffins.

Joe Liebezeit and **Amelia O'Connor** (Audubon Society) and **Melissa Robell** (USFWS Intern) conducted a community science seabird monitoring project within the Cape Perpetua and Cape Falcon Marine Reserves. With the help of 32 volunteers, 50 cormorant nests (21 Brandt's, 21 Pelagic, 8 Double-crested) in the Cape Perpetua Marine Protected Area (just south of the Reserve) and 36 nests (11 Brandt's, 10 Pelagic, 15 Double-crested) on two different colonies in the Cape Falcon Marine Reserve were monitored. A preliminary look at the data showed roughly 97 chicks fledged from the 36 Cape Falcon nests (18 Brant's, 10 Pelagic, 34 Double-crested). Breeding productivity (average fledglings per nest) was relatively high this year with Brandt's Cormorants averaging just

over 3 fledglings per every two nests and Double-crested producing nearly 5 fledglings per two nests at both Cape Perpetua and Cape Falcon. Hatch success was relatively high with no more than 3 failed nests for each species at both sites, except Pelagic Cormorants at Cape Falcon experienced 50% hatch success. Unfortunately, sample sizes are very low for the Pelagic Cormorants, in part because cormorants did not return to some previously monitored colonies. The highest abundance counts in the Sea Lion Caves were 11 Rhinoceros Auklets (*Cerorhinca monocerata*) and 166 Pigeon Guillemots (*Cephus columba*). During monitoring, the team also educated over 500 visitors through outreach at both sites this season.

Initial data review shows that this was a very productive year compared to 2017 for all three cormorant species. In part this may be due to a lack of major storms this summer. Last year, large portions of colonies lost eggs and completely rebuilt nests after storms with high winds and rain, while this year renesting did not occur in any monitored plots. This also resulted in monitoring finishing nearly a month earlier this year.

An Intra-Agency Agreement between the Bureau of Ocean Energy Management (BOEM), Department of the Interior, and the USFWS Pacific Region was completed. The purpose of the agreement was to secure proper data management and obtain data synthesis of long-term aerial seabird colony data (photographs) collected at breeding sites surveyed by USFWS Oregon Coast National Wildlife Refuge Complex and Washington Maritime National Wildlife Refuge Complex along the Oregon and Washington coasts. The specific objectives are:

1. Secure seabird colony count legacy data collected from 1972 to the present by converting film slides to digital images, cataloging, archiving, and counting birds on aerial images of seabird colonies to estimate colony site populations by species. Slide processing will

be conducted by Oregon State University personnel (**Kirsten Bixler** and **Jess Porquez**) under supervision of **Shawn Stephensen**.

2. Develop and populate a database that will be made available to the scientific community, the general public, and other government agencies by regular uploading to online portals.
3. Provide data products, analyses, and reports that summarize and communicate analyses to BOEM and the general public to support incorporation of marine bird abundance and distribution into planning processes and risk assessment of renewable energy siting and decision support.

Turnstone Environmental Consultants, Inc. (Turnstone) conducted work related to seabirds for several projects in 2018, which are summarized below. These projects involved surveys for Marbled Murrelets (*Brachyramphus marmoratus*) and all surveys were conducted according the PSG's 2003 protocol requirements. The Oregon Department of Forestry (ODF) contracted Turnstone to conduct Marbled Murrelet surveys on state lands in the Coast Range of Oregon in four ODF districts (Astoria, Tillamook, Western Lane, and West Oregon). Visiting a mixture of first, second and multi-year survey sites, surveyors conducted 1,123 surveys at 163 unique sites and 704 unique stations. Murrelets were detected during 24 surveys at 12 sites in 5 different districts, and significant behavior was observed during 4 of these surveys. **Tom Williamson** is the Turnstone project manager and **Matt Gostin** is the ODF primary contact.

Turnstone conducted Marbled Murrelet surveys at first, second, and multi-year sites for two districts of the Bureau of Land Management (BLM) in 2018. The BLM Northwest Oregon District contracted Turnstone to conduct Marbled Murrelet surveys in areas managed by the Marys Peak and Tillamook Field Offices. Turnstone

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biologists conducted 263 surveys at 50 unique sites and 169 unique stations. Murrelets were detected during six surveys at three sites, and significant behavior was observed during one of these surveys. **Jeff Reams** is the Turnstone project manager and **Scott Hopkins** is the BLM primary contact. The BLM Coos District contracted Turnstone to conduct Marbled Murrelet surveys in survey areas within the Coos District, Oregon. Turnstone biologists conducted 230 surveys at 39 unique sites and 170 unique stations. Murrelets were detected during 30 surveys at 14 sites, and significant behavior was observed during 10 of these surveys. **Jeff Reams** is the Turnstone project manager and **Jennifer Kirkland** is the BLM primary contact.

Turnstone conducted Marbled Murrelet surveys for two Bonneville Power Administration projects in 2018. For a project located near Philomath, Oregon, Turnstone biologists conducted 45 surveys at 9 unique sites and 44 unique stations. Murrelets were not detected during these surveys. **Tom Williamson** is the Turnstone project manager. For a project located near Raymond, Washington, Turnstone biologists conducted 20 surveys at 4 unique sites and 16 unique stations. Murrelets were not detected during these surveys. **Tom Williamson** is the Turnstone project manager. Turnstone biologists also conducted Marbled Murrelet surveys in the Oregon Coast

Range for three other private clients. A total of 92 surveys over 15 unique sites and 62 unique stations were conducted. Murrelets were detected during five surveys at four sites, and significant behavior was observed during two of these surveys. **Jeff Reams** was the Turnstone project manager for two of these projects, and **Tom Williamson** was the Turnstone project manager for the third.

2018. Marine Pollution Bulletin: DOI: 10.1016/j.marpolbul.2018.03.043).

In addition to participating in Marbled Murrelet (*Brachyramphus marmoratus*) population monitoring in Oregon (see report in Oregon-Washington), **Craig Strong** of Crescent Coastal Research continued to conduct Pelagic Cormorant (*Phalacrocorax pelagicus*) productivity monitoring at two colonies in northern California during 2018. At Tolowa Rock (41° 40.3' N) 32 nesting pairs produced a mean of 1.88 chicks per nest, and at Hunter Island (41° 57.3' N) 52 pairs produced a mean of 2.06 chicks per nest. At both sites nesting numbers and productivity were above average for the past 5 years, with much higher nesting numbers at Hunter Island. Hunter Island, located at the edge of a Marine Protected Area (MPA), has outperformed the colony at Tolowa Rock since the MPA was established in 2014, though whether this is a causal relation is of course unknown. Good cormorant success, combined with healthy 'normal' ratios of Common Murre (*Uria aalge*) and Marbled Murrelet chick-to-adult numbers tallied on at-sea surveys, indicates the California Current has recovered to some extent in this region compared with the calamitous conditions of the prior 2 years.

Humboldt Redwood Company, LLC (HRC) continued the conservation activities for the Marbled Murrelet under the company's Habitat Conservation

NORTHERN CALIFORNIA

Compiled by Kirsten Lindquist

Christine Fiorello, Kyra Mills and **Mike Ziccardi** (Oiled Wildlife Care Network) collaborated with **Juliet Lamb** (post-doctoral researcher, Clemson University [CU] and South Carolina Cooperative Fish and Wildlife Research Unit [SCCRU]), **Patrick Jodice** (USGS-SCCRU, CU), and **Yvan Satgé** (research specialist, CU-SCCRU) to track the movements and characterize the habitat of California Brown Pelicans (*Pelecanus occidentalis californicus*) that were oiled and rehabilitated following the Refugio oil spill of June 2015. Their results indicated that, although rehabilitated pelicans undertake long-distance movements, they may display increased dispersion and reduced breeding investment, particularly among females (Lamb et al.



Brown Pelican. Photo credit: Timothy Lawes

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Plan (HCP). Project leaders were **Sal Chinnici** and **Mark Freitas**. The HCP requires tracking of murrelet occupancy and numbers over time using both radar and audio-visual (AV) survey techniques. Surveys were continued in 2018 at the Headwaters Forest Reserve and Humboldt Redwoods State Park (the Reserves), and also at the Marbled Murrelet Conservation Areas (MMCAs) on HRC forestlands, with the collaboration of **Sean McAllister**, O'Brien Biological Consulting, and **Adam Brown**.

Since the inception of HCP monitoring (1999), occupied behaviors have been observed in the MMCAs and Reserve stands using AV surveys. In 2018, surveyors conducted 139 surveys at 33 stations and observed occupied behaviors (below canopy flight or circling) in the Headwaters Forest Reserve, Humboldt Redwoods State Park, and the Allen Creek and Bell Lawrence MMCAs.

Radar surveys track murrelets traveling to and from nesting areas within the MMCAs and Reserves. Radar counts are considered indices of the breeding population. In 2018, 56 radar surveys were conducted at 14 sites. Most murrelets tracked by radar were at Humboldt Redwoods State Park and the Allen Creek MMCA. Final analyses of the 2018 data have not yet been conducted. The 2017 data indicated that after 15 years of monitoring, trends in radar counts of murrelets in the MMCAs and Reserves have differed during the study period; there has been a decline in radar counts in both the Reserves and the MMCAs since the 2002 baseline, but the decline in radar counts in MMCAs has been smaller.

Claire Nasr (Humboldt State University), **Shannon Brinkman** (Bureau of Land Management), and **Daniel Barton** (Humboldt State University) continued field monitoring efforts of nesting success and habitat use of nearshore seabirds around Trinidad Head and Patrick's Point for the sixth consecutive year, adding new sites and small boat surveys as well as a thesis

project studying spatial modeling of seabird disturbance risk in this area in collaboration with the Trinidad Chapter of the Seabird Protection Network (SPN). The monitoring effort at this site intersects with a citizen scientist project coordinated by **Shannon Brinkman** and the SPN, and compliments outreach efforts by the SPN to reduce seabird disturbance risk at these sites. Principal species monitored by these projects include cormorants (three *Phalacrocorax spp.*), Western Gull (*Larus occidentalis*), Pigeon Guillemot (*Cephus columba*), and Common Murre. University of California-Davis National Science Foundation Research Experience for Undergraduates student **Jade Little** and **Daniel Barton** conducted several analyses of change over time in Pelagic Cormorant nesting success in the area. **Daniel Barton** conducted a pilot study on the use of drones for monitoring abundance at several seabird colonies in the greater Humboldt Bay area. **Rebecca Garwood**, **Justin Garwood**, and **James Ray** (all with California Department of Fish and Wildlife), and **Daniel Barton** continued an ongoing Double-crested Cormorant (*Phalacrocorax auritus*) and Caspian Tern (*Hydroprogne caspia*) diet study in Humboldt Bay into its second year, obtaining numerous pellets at local colonies as well as locating several thousand Passive Integrated Transponder tags from salmonid tagging efforts in local seabird colonies. **Daniel Barton** continued work on time-series modeling of counts of seabirds and waterbirds in the region with a focus on determining the strengths and weaknesses of alternative approaches to variance components analysis of state-space models for different types of survey data.

3 April 2018 marked the 50th anniversary of Point Blue's field station on Southeast Farallon Island (SEFI) and the start of the 51st year monitoring the population size, reproductive success, and diet for 13 species of breeding seabirds. To celebrate, **Mike Johns** and **Pete Warzybok** (Point Blue

Conservation Science) in coordination with **Gerry McChesney** and **Jonathan Shore** (U.S. Fish and Wildlife Service [USFWS] Farallon Islands National Wildlife Refuge) continued the long-term monitoring program as had been done by countless seabird biologists over the previous 5 decades. 2018 was a primarily average year for most species. Cooler sea surface temperatures and moderate upwelling conditions persisted throughout much of the spring and summer, leading to productive local ocean conditions and an abundance of krill (euphausiids) around the islands. Planktivorous Cassin's Auklets (*Ptychoramphus aleuticus*) exhibited above average productivity for the tenth consecutive year, though it was the lowest value during that period. Cassin's also bred exceptionally early with more than 85% of pairs having laid by April 15th. For the first time since 2013, Common Murre productivity was also slightly greater than the long-term mean for this species. Rhinoceros Auklets (*Cerorhinca monocerata*) and Brandt's Cormorants (*Phalacrocorax penicillatus*) breeding success were both higher than last year and above average for the sixth consecutive year. In contrast, Pigeon Guillemots had reduced productivity in 2018 and produced fewer chicks than average for the fourth consecutive year. Pelagic Cormorants were present around the island throughout the season but very few pairs attempted to breed and those that did bred very late in the season. Western Gulls surprisingly had higher breeding success this season with the greatest number of chicks fledged since 2013. The California Gull (*Larus californicus*) population continues to decline on SEFI, and no eggs or chicks were observed in 2018. Northern anchovy (*Engraulis mordax*) were the dominant prey item in chick diet for Common Murres and Rhinoceros Auklets. Juvenile rockfish (*Sebastodes spp.*) were also present, but in much lower abundance than in previous years. Ocean productivity seemed to decline late in the season and chick growth rates were slow. Approximately 30% of the

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Cassin's Auklet population attempted a second brood after successfully fledging their first chick, but most of these attempts were abandoned. Canada Geese (*Branta canadensis*) nested on the Farallones for the eighth consecutive year and managed to fledge 7 chicks from 4 total nests. Warm water species such as Brown (*Sula leucogaster*) and Blue-footed Boobies (*Sula nebulosus*), which had become regular during the warmer years of 2014 to 2017 were largely absent this season. In addition to regular monitoring work, this was the 4th season of geolocator deployments on Cassin's Auklets and 2nd season on Pigeon Guillemots, in an effort to better understand the winter dispersal patterns of alcids from the Farallones. Preliminary results indicate Cassin's remain off the Central California Coast during the non-breeding season, while Pigeon Guillemots appear to overwinter north of Vancouver Island in British Columbia.

1 October 2018 marked the 25th anniversary of Beach Watch, the coastal monitoring program of Greater Farallones National Marine Sanctuary and Greater Farallones Association. In 2018 Beach Watch monitored 57 survey sites over 5 counties in North Central California. 2018 was a quiet year for seabird and marine mammal mortality in central California which is typical of the productive La Niña conditions. Post breeding carcass deposition of Common Murre, in August – September, was only 48% of long term mean (1993–2017) deposition during these months. Northern Fulmar (*Fulmarus glacialis*) deposition was notably higher this year from March – September suggesting higher than average numbers of over summering birds.

2018 marks the 15th field sampling season of the Applied California Current Ecosystem Studies (ACCESS) project. ACCESS is a collaborative effort of Cordell Bank National Marine Sanctuary, Greater Farallones National Marine Sanctuary, and Point Blue Conservation Science for ongoing data collection to understand status



Cassin's Auklet. Photo credit: Michael Johns

and trends of sanctuary resources, ecosystem health, and response to climate change. Scientists collect seabird and marine mammal data, oceanographic measurements, marine debris, and sample for prey availability along predetermined transect lines. This year spring upwelling conditions in May made for rough seas but good ocean productivity. The summer cruise was on the National Oceanic and Atmospheric Administration (NOAA) ship Bell M. Shimada, allowing for summer upwelling conditions to be sampled during rough seas. Good ocean productivity was indicated by abundant plankton and whales. Most notable were humpback (*Megaptera novaeangliae*), blue (*Balaenoptera musculus*) and fin (*Balaenoptera physalus*) whales foraging over the continental shelf as well as within the shipping lanes, making them more vulnerable to being struck and killed by ships. The third and final cruise of the year was in September, to sample post upwelling conditions. The seas were exceptionally calm but foggy conditions made observations challenging. Highlights included lunge feeding humpback and blue whales concentrated near the shelf break, where they normally occur. Seabird sightings included resident post-breeding season Common Murres, Cassin's Auklets,

Rhinoceros Auklets, and various transient species of shearwater, fulmar, phalaropes, and numerous storm-petrels. Krill were abundant north of Cordell Bank on the shelf, but sparse off the shelf break and in the Tucker Trawl samples. For more information contact the Principal Investigators, **Jaime Jahncke** (Point Blue Conservation Science) jjahncke[at]pointblue[dot]org, **Dani Lipski** (NOAA Cordell Bank National Marine Sanctuary) Danielle[dot]lipski[at]noaa[dot]gov, or **Jan Roletto** (NOAA Greater Farallones National Marine Sanctuary) Jan[dot]Roletto[at]noaa[dot].gov.

Farallon Institute seabird observers **Michael Force** and **Brian Hoover** participated in the following at-sea surveys: California Cooperative Oceanic Fisheries Investigation (CalCOFI) winter survey 2018; CalCOFI spring survey 2018; and National Marine Fisheries Service Rockfish Recruitment and Ecosystem Survey (RREAS) 2018. These surveys document the distribution and abundance patterns of top predators in the California current ecosystem, and represent the 31st year of seabird data collection for CalCOFI and the 15th year for RREAS. Data from these cruises are shared with the California Current Integrated Ecosystem Assessment program at NOAA and with the

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Integrated Ocean Observing System, and are also being used by federal and independent researchers studying seabirds in California waters. Results from these most recent surveys did not document any significant shifts in seabird abundance, relative to the long-term average from each time-series. During the spring cruises, however, fin and humpback whales were documented in unprecedented high densities, suggesting a community shift in marine mammal distributions.

Heather Robinson, Julie Thayer (Farallon Institute), and **Tori Seher** (National Park Service, Golden Gate National Recreation Area) continued the long-term monitoring of breeding seabird colonies on Alcatraz Island in San Francisco Bay. Favorable ocean conditions and prey availability may have contributed to the highly productive season observed in 2018. Brandt's Cormorants were present at the highest level ever observed in the time series. Data has not yet been processed to determine reproductive success but it is expected to be above the long-term average (1995 - 2017). After several years of declines, the Western Gull breeding population increased in 2018. Pelagic Cormorants did not nest on the Island for the fifth consecutive year and the few nesting pairs of California Gulls were unsuccessful in fledging chicks. Three Black Oystercatcher (*Haematopus bachmani*) pairs nested on Alcatraz in 2018, up one from the previous year. Video cameras were used for the fourth year to monitor reproductive success and diet of Pigeon Guillemots.

Susan Euing (USFWS employee and contractor to Department of Veterans' Affairs [VA]) and **Jennifer Walton** (USFWS intern) monitored the nesting colonies of two tern species at VA Alameda Point in Alameda, CA: California Least Terns (*Sternula antillarum browni*) and Caspian Terns. **Susan** led 11 volunteer work parties from September 2017 through April 2018, clearing weeds and preparing the nesting sites prior to the nesting seasons for each species.

The first California Least Tern (LETE) in 2018 was seen at VA Alameda Point on 18 April. **Meredith Elliott** and **Sarayu Ramnath** (Point Blue employee and intern, respectively) assisted **Susan** and **Jennifer** twice weekly with walking-in-colony surveys of the LETE colony for the May to August nesting season. Moreover, **Jennifer** and **Susan** conducted observations from a vehicle blind outside the colony using scope and binoculars four days a week to track nest activity and predator presence. The first LETE nest was discovered on 12 May and the first chicks hatched on 5 June. The first fledgling was observed on 21 June. The last LETE was observed on 27 August. Despite heavy predation by Peregrine Falcons (*Falco peregrinus*) and Burrowing Owls (*Athene cunicularia*) and substantial loss due to abandoned and non-viable eggs, the hatch rate was 74% and surviving fledgling rate was 41%. There are two on-going studies going on at the LETE colony: a diet study, using both collected dropped fish and pellets, and a provisioning study using camera traps.

Caspian Terns (CATE) were first observed at VA Alameda Point on 28 February, possibly the earliest sighting for this location. First nests were observed on 20 April and the first chicks were seen on 11 May. The highest snapshot count of adult Caspian Terns was 591 on 3 August. Unlike the LETE colony, nesting observations were made during walking-in-colony surveys within the CATE colony for only half of the breeding season (20 April to 7 June). The remaining observations were made from a vehicle blind from a distance and using scope and binoculars. From these latter observations, we viewed two, possibly three waves, of nesting. 34 downy CATE chicks were observed on 14 August. As of 25 September 2018, a few CATEs remained on the property.

On 11 August, in addition to the CATE population at their nesting site, approximately 3,500 Western Brown Pelicans (*Pelecanus occidentalis*) and 1,200 Elegant Terns (*Thalasseus elegans*) were observed roosting on the

VA Alameda Point property near the CATES.

Mark Rauzon (Laney College) is Vice-chair of Conservation for PSG and has written letters representing the Pacific Seabird Group's opinion and perspective on Marbled Murrelets in particular, and marine debris, feral cats, and fisheries issues in general. He also attended the International Ornithological Congress and co-sponsored a symposium, along with **Simba Chan** (BirdLife International - Asia Division) on Conservation Reliant Seabirds focusing on Chinese Crested Terns (*Thalasseus bernsteini*). He also presented the poster: "Double-crested Cormorants relocate from Old to New San Francisco-Oakland Bay Bridge", and is working on a paper summarizing 30 years of research on Double-crested Cormorants with six other authors.

David Ainley and others completed a project summarizing multiple data sets to assess the implications and effectiveness of ecosystem-based fishery management in the central California Current region. The data analysis project was funded by NOAA and four publications resulted, as well as a presentation to the Pacific Fisheries Management Council annual meeting in March 2018. Otherwise, H.T. Harvey & Associates and RGF Consultants have been busy summarizing the at-sea population size and distribution of Ashy Storm-Petrels (*Oceanodroma homochroa*), a project partly funded by the National Fish and Wildlife Foundation.

Dan Anderson is working under California Institute of Environmental Studies (CIES) auspices with **Deborah Jacques** of Pacific Eco Logic to gather a final season of data, then summarize and evaluate long-term coastal monitoring of Brown Pelican age-structure as a second method to measure and evaluate metapopulation reproductive performance.

The Common Murre Restoration Project completed its 23rd season of monitoring as part of a program to restore Common Murre colonies damaged by oil spills, led by principal

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Pelagic Cormorant. Photo credit: Michael Johns

investigators **Gerry McChesney** (USFWS) and **Richard Golightly** (Humboldt State University [HSU]) with funding from the Luckenbach Trustee Council. The project monitors productivity, breeding population size, and disturbance to Common Murres as well as Brandt's Cormorants, Pelagic Cormorants, Western Gulls, Black Oystercatchers and Pigeon Guillemots. Monitoring took place at three central California coast colonies: Point Reyes Headlands (PRH), Devil's Slide Rock & Mainland (DSRM), and the Castle-Hurricane Colony Complex (CHCC). Biologists **Cassie Bednar**, **Zofia Burr**, **Justin Windsor** and **Amy Wilson** along with field technicians **Emily Schmidt** and **Jonah Kuwahara-Hu** (HSU) conducted field observations throughout the breeding season, from mid-April to mid-August.

In 2018, productivity (chicks fledged per pair) was higher than or consistent with the long-term average for Common Murre, Pelagic Cormorant and Western Gulls at all three monitored colonies. In contrast, Brandt's Cormorant productivity was similar to the long-term average at PRH but lower than the long-term averages at DSRM and CHCC. Oystercatchers were only monitored at CHCC where they had higher than average productivity.

Numbers of Brandt's Cormorant nests appeared to be lower in 2018 than in 2017 at all three colonies. Disturbance to seabirds from human sources primarily were from aircraft and watercraft. Recreational drone use at and near colonies is increasing and this may pose future problems. Recent patterns of high murre egg and chick predation by Common Ravens (*Corvus corax*) at DSRM continued, although productivity in the plots was still relatively high. Non-native red fox (*Vulpes vulpes*) were discovered along with likely predation on mainland-nesting seabirds at DSRM.

Gerry McChesney and **Cassie Bednar** also worked with **Phil Capitolo** (University of California Santa Cruz) to conduct aerial photographic surveys of coastal California Double-crested Cormorant and other seabird colonies, with funding from USFWS Migratory Birds.

2018 marked the 26th consecutive year of seabird monitoring at Año Nuevo Island, located in San Mateo County, California. Oikonos Ecosystem Knowledge's **Ryan Carle** and **Jessie Beck** (Project Managers), **Emily Coletta** (Project Ecologist II), and **David Calleri** (Project Volunteer) monitored breeding population and productivity of Rhinoceros Auklets, Cassin's Auklets, Pelagic Cormorants (island

and mainland), Brandt's Cormorants, Western Gulls, Pigeon Guillemots, and Black Oystercatchers during weekly visits to the island. Rhinoceros and Cassin's Auklets were monitored both in natural burrows, as well as in artificial clay nest modules.

Preliminary data suggest the 2018 season hosted the largest numbers of breeding Rhinoceros and Cassin's Auklets on record. Rhinoceros Auklet diet samples showed a strong prevalence of northern anchovy (*Engraulis mordax*).

In 2018, Oikonos continued to perform habitat restoration on the island to improve auklet burrowing habitat, installing hundreds of square meters of erosion control material and spreading native seed. Oikonos continued its collaboration with **Nathan Lynch**, ceramicist of the California College of the Arts, and deployed 8 new artificial clay modules especially designed for Cassin's Auklets. There was one breeding attempt in these new modules, the group of which was deployed in November of 2017.

Corinne Gibble (California Department of Fish and Wildlife, Office of Spill Prevention and Response, Marine Wildlife Veterinary Care and Research Center in Santa Cruz, CA) continues to monitor the morbidity and mortality of seabirds in California through systematic necropsy. She published a journal article in 2018 (Gibble et al. 2018. Journal of Wildlife Diseases) and a book chapter with co-author **Brian Hoover** (Farallon Institute) (Gibble and Hoover 2018 in Burkholder and Morton editors. Harmful Algal Blooms, a compendium desk reference).

Josh Adams, **Jonathan Felis**, and **Max Czapanskiy** (U.S. Geological Survey [USGS]), in collaboration with **David Pereksta** (Bureau of Ocean Energy Management [BOEM]), are finalizing a report and data release on tracking of seabirds in the Main Hawaiian Islands to support renewable energy planning.

Josh Adams and **Emma Kelsey** (USGS), in collaboration with **Donna**

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Schroeder and **David Pereksta** (BOEM) and **Kevin Lafferty** (USGS) are publishing a seabird monitoring survey report and associated database that compiles information about seabird and marine mammal research and monitoring efforts throughout California, Oregon, Washington, Alaska, and Hawaii.

Josh Adams, Emma Kelsey, Amelia DuVall (USGS), **Peter Larrmendy**, and **Jim Howard** (California Institute of Environmental Studies [CIES]) conducted four mist-netting sessions (May-August) for Ashy Storm-petrels on Prince Island in the California Channel Islands.

Josh Adams, Emma Kelsey, and **Laney White** (USGS), with observer support from **Ryan Carle, Jessie Beck, Caitie Kroeger**, and **Alex Rinkert** conducted at-sea Marbled Murrelet surveys in Conservation Zone 6 in Central California to estimate abundance and juvenile ratios for murrelets. This project was funded by the Luckenbach Oil Spill Trustee Council. **Jonathan Felis, Josh Adams**, and **Emma Kelsey** (USGS) published the findings from the 2017 murrelet surveys in the same zone (Felis et al U.S. Geological Survey Data Series 1093, 12 p., <https://doi.org/10.3133/ds1093>).

Jonathan Felis (USGS), **Josh Adams** (USGS), **Zach Peery** (University of Wisconsin - Madison), **Bill Henry** (Groundswell Ecology), **Ben Becker** (National Park Service), and **Portia Halbert** (California State Parks) published a data release of all standardized murrelet surveys conducted in Zone 6 from 1999-2017 (Felis et al. 2018 U.S. Geological Survey data release, <https://doi.org/10.5066/F75B01RW>).

Josh Adams, Jonathan Felis, and **Emma Kelsey** (USGS), in collaboration with **Bill Standley** (Bureau of Land Management), **Matthew McKown**, **Jeff Schlueter**, and **Kerry Dunleavy** (Conservation Metrics Inc.), and with help from **Ryan Carle** (Oikonos), **Jessie Beck** (Oikonos), **David Mazurkiewicz** (Channel Island National Park), **Amelia DuVall** (USGS), **Mike Parker**

(CIES), **Justyn Stahl** (Institute for Wildlife Studies), **Ben Becker** (Point Reyes National Seashore), **Stephanie Schneider** (Moss Landing Marine Lab), **Dan Barton**, and **Clair Nasr** (Humboldt State University) deployed acoustic monitors on 30 rocks and islands off the California coast (primarily within the California Coastal National Monument) to detect presence and distribution of storm-petrel species. Summary report of 2017 efforts available upon request.

Jonathan Felis and **Josh Adams** (USGS) worked with **Ryan Carle** (Oikonos) and Chilean collaborators to study foraging ecology, diving behavior, fisheries overlap, and migratory behavior of Pink-footed Shearwaters (*Ardeenna creatopus*). Multiple manuscripts are in prep/review this year.

Josh Adams and **Jonathan Felis** (USGS) continued to work with **Jefferey Leirness** (NOAA Biogeography Branch), **Lisa Ballance** (NOAA Southwest Fisheries Science Center), **Trevor Joyce** (NOAA Southwest Fisheries Science Center), and **Dave Pereksta** (BOEM) to procure and process seabird survey datasets to model at-sea density of marine birds to support renewable energy planning on the US Pacific outer continental shelf.

Scott Shaffer (San Jose State University) is continuing to study the foraging ecology of Laysan and Black-footed Albatrosses (*Phoebastria immutabilis* and *P. nigripes*) from Midway Atoll in collaboration with **Lesley Thorne** (Stony Brook University), **Leigh Torres, Rachael Orben**, and **Rob Suryan** (Oregon State University). **Scott** is also collaborating with **Rachael Orben, Rosana Paredes** (Oregon State University), and **Sasha Kitaysky** (University of Alaska, Fairbanks) on a project that focused on the breeding distribution and ecology of red-legged and black-legged kittiwakes in the Pribilof Islands. Scott's former M.Sc. student **Abram Fleishman** (San Jose State University) worked in the field with **Rachael** and examined the effects of mercury level on breeding success in the kittiwakes. **Abram** defended his

thesis in May 2018. **Caitie Kroeger** and **Scott Shaffer** (San Jose State University) continue to collaborate with **David Thompson** and **Paul Sagar** (National Institute of Water and Atmospheric Research in New Zealand), and **Leigh Torres**. **Caitie Kroeger** studied the foraging ecology and energetics of two albatross species at Campbell Island in New Zealand. She is planning to finish her dissertation in early 2019. Former doctoral student **Morgan Gilmour** completed her dissertation (June 2018) with **Scott Shaffer** at the University of California Santa Cruz. **Morgan's** research focused on the links between foraging ecology and contaminant exposure in seabirds of Mexico and the central tropical Pacific. **Scott** and his student **Cole Jower**, are continuing research with **Russell Bradley, Pete Warzybok**, and **Jamie Jahncke** of Point Blue Conservation Science at the Farallon Islands to examine the foraging and breeding ecology of Rhinoceros Auklets and Western Gulls. This research is part of a larger project with **Sue Cockerham** and **Dr. Cleber Ouvnery** (San Jose State University), **Rob Suryan, Leigh Torres, Amanda Gladics**, and **Rachael Orben** (Oregon State University), **Hillary Young** (University of California Santa Barbara), **Josh Adams** and **Emma Kelsey** (USGS), **Corey Clatterbuck** (San Diego State University) to compare the foraging ecology of Western Gulls along California and Oregon. **Scott Shaffer** and his former M.Sc. student **Greg Taylor** published on a project with **Josh Ackerman** (USGS) that examined the effects of mercury contamination on the egg attendance behavior of Forster's Terns (*Sterna forsteri*) in San Francisco Bay. Finally, **Scott** continues collaborating with **Olivier Chastel, Pierre Blevin, Henri Weimerskirch, Fredric Angelier, and Christophe Barbraud** of Centre National de la Recherche Scientifique-Centre d'Etudes Biologiques de Chizé in France to examine egg attendance behavior and contaminants in high latitude species.

Samantha Richman and **Susan De La**

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Cruz (both USGS Western Ecosystems Research Center) are finishing up a report on targeted restoration actions for sea ducks injured by coastal oil spills for the Natural Resource Damage Assessment and Restoration Program. They have started a pilot habitat restoration project in San Francisco Bay to enhance habitat and food resources for wintering populations of waterfowl.

SOUTHERN CALIFORNIA

Compiled by André Raine

Trevor Joyce is a National Research Council postdoctoral associate working with **Lisa Ballance** at the National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center (SWFSC). **Trevor** is jointly developing a database of seabird transect surveys in the California Current spanning multiple decades and research projects. This nearly comprehensive database will enable the development of seabird species distribution and relative abundance models by researchers at the NOAA National Centers for Coastal Ocean Science. **Trevor** is also helping to create an atlas of seabird at-sea distribution patterns over the California Current, Hawaii, the Line Islands, and the Eastern Tropical Pacific using extensive SWFSC strip transect sampling. **Trevor's** research interests also include abundance estimation, foraging ecology, and responses to El Niño-Southern Oscillation climatic variability.

Annette Henry works with the NOAA Fisheries' National Seabird Program which is tasked to monitor and reduce seabird bycatch in U.S. Fisheries, support global efforts to reduce seabird interactions with international fisheries, and promote the importance of seabirds as ecosystem indicators as a vital component of healthy ocean habitats. She continues studying the migration energetics of Eared Grebes (*Podiceps nigricollis*).



Rhinoceros Auklet. Photo credit: David Pereksta

David Mazurkiewicz outlined work carried out in 2018 in the Channel Islands National Park. Seabird habitat restoration efforts continued on Anacapa Island with support from the California Institute of Environmental Studies (CIES) and Montrose Settlements Restoration Program combining efforts with Channel Islands National Park (CINP) and Channel Islands Restoration to improve native plant cover for seabirds at East Anacapa Island. Since 2016, over 10,500 native plants have been installed in approximately three restored acres. Seabird monitoring efforts in CINP have been performed with support from CIES at Anacapa, Santa Barbara, Santa Cruz, and San Miguel islands (Prince Island with **Josh Adams**, U.S. Geological Survey [USGS]) with funding from various sources including the Montrose Settlements Restoration Program.

At Anacapa Island: California Brown Pelicans (*Pelecanus occidentalis*) breeding population and reproductive success estimates are obtained with support from the Ventura U.S. Fish and Wildlife Service (USFWS) office. This work is funded through 2020. Scripps's Murrelet (*Synthliboramphus scrippsi*) reproductive monitoring and nocturnal spotlight surveys were conducted with support from Sonoran Joint Venture and private donors. Twenty artificial nest

modules for alcids have been installed within the habitat restoration area.

At Santa Barbara Island: California Brown Pelican breeding population and reproductive success estimates are obtained with support from the Ventura USFWS office. This work is funded through 2020. Reproductive monitoring of Scripps's murrelets continued and has been done annually since 2007; 100 artificial nest modules are monitored annually for Cassin's Auklet (*Ptychoramphus aleuticus*) and Scripps's Murrelet nesting as part of this effort. Mist net captures were performed for Ashy Storm-petrel (*Oceanodroma homochroa*) monitoring in cooperation with **Josh Adams**.

At Santa Cruz Island: Cassin's Auklet reproductive monitoring at Scorpion Rock continued. Reproductive monitoring of Ashy Storm-petrel at multiple sea cave colonies and Orizaba Rock continued in 2018 with the support of partners **Josh Adams** (USGS), **Bill McIver** (USFWS), and CINP. Lastly, at San Miguel Island, annual mist-netting of Ashy Storm-petrels was conducted in conjunction with USGS, CIES and CINP at Prince Island.

Josh Adams, Laney White, Amelia DuVall, and Cheryl Horton (USGS), in collaboration with **David Pereksta** (Bureau of Ocean Energy Management),

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have started aerial surveys of seabird and marine mammal distributions off Southern California.

HAWAII Compiled by André Raine

André Raine, Megan Vynne, Scott Driskill and the rest of the team from the Kaua'i Endangered Seabird Recovery Project (KESRP) continued a number of long running conservation and research programs on the island of Kaua'i, focused on the three endangered seabirds breeding on the island; Newell's Shearwater (*Puffinus newelli*), Hawaiian Petrel (*Pterodroma sandwichensis*), and Band-rumped Storm-petrel (*Oceanodroma castro*). The long-term predator control and seabird monitoring projects continued at Upper Limahuli Preserve and five sites in Hono O Nā Pali NAR, with intensive cat, rat, pig and introduced Barn Owl (*Tyto alba*) control. The results at the end of the 2017 breeding season revealed the highest reproductive success rates and call rates to date across most sites, showing that these projects are having significant and measurable conservation effects. We are awaiting the results of the end of the 2018 season to see if these positive results continue. A translocation project for Newell's Shearwater and Hawaiian Petrel continued for the fourth year in 2018, with 19 Newell's Shearwater and 20 Hawaiian Petrel being translocated from mountain colonies to the predator proof fence at Nihokū (Kīlauea Point NWR) as part of a multi-partner project including KESRP, Pacific Rim Conservation, American Bird Conservancy, National Fish and Wildlife Foundation, U.S. Fish and Wildlife Service (USFWS), Hawaii Department of Land and Natural Resources (DLNR), Pacific Studies Co-operative Unit and National Tropical Botanical Garden. With this year's chicks, a total of 70 Hawaiian Petrel and 45 Newell's Shearwater have now been translocated since 2015. KESRP also continued to work with the County of Kauai to devise a way to allow night football games to occur on Kauai without

impacting endangered seabirds (in the past, Newell's Shearwater fledglings have been attracted to the lights of night football games, resulting in significant fallout leading to a cessation of games in the last few years). KESRP provided the County with a risk calculator (based on time of year, moon phase and moon rise times) for proposed dates for games in September 2018, with the result that three night football games were played just before the fallout season, with no downed seabirds.

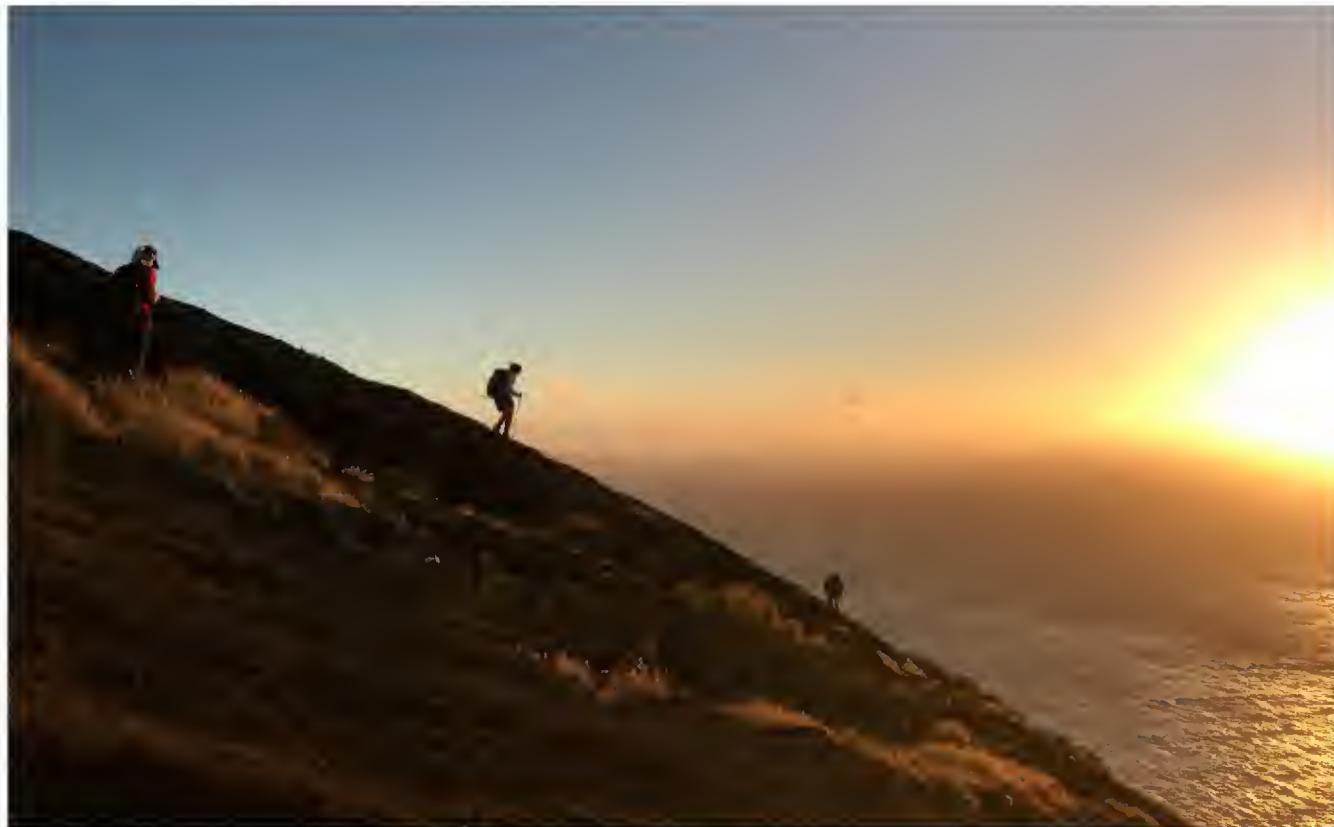
KESRP also continues to undertake seabird monitoring on Lehua Islet, which was particularly important in 2018 due to the on-going rat eradication and ecosystem restoration project on the islet that was initiated in 2017. The project is run by the Hawai'i DLNR Division of Forestry and Wildlife (DOFAW), in conjunction with federal sponsor USFWS, technical partner Island Conservation, and the cooperating members of the Lehua Island Restoration Steering Committee. KESRP's work on the islet included annual albatross counts, song meters targeting a number of seabirds to assess change before and after rat eradication efforts started, and 75 permanent seabird plots focusing on ground nesting seabirds. We also monitored over 400 burrows of Wedge-tailed Shearwaters (*Ardenna pacifica*), Bulwer's Petrels (*Bulweria bulwerii*) and Red-tailed Tropicbirds (*Phaethon rubricauda*) throughout the season to assess potential changes in reproductive success rates after the rat eradication project was initiated. In conjunction with **Rachel Sprague** and **Elizabeth Kain** (Pūlama Lāna'i), KESRP has also continued in its fourth year of monitoring the Hawaiian Petrel colonies of the island of Lāna'i, using a combination of song meters, burrow checks, auditory surveys and burrow cameras. Reproductive success rates have improved dramatically on Lāna'i since the initiation of a new predator control project by Pūlama Lāna'i. This year, data loggers were also deployed on Hawaiian Petrels to chart overland flyways to and from colonies in the

mountains.

As part of KESRP's Underline Monitoring Project, **Marc Travers, Angela Stamen, Theresa Geelhoed, Adam Elzinga, and André Raine** continued to investigate seabird take through power line collisions on Kaua'i. Using acoustic monitoring of power line collisions and direct observations of seabird collisions and dead birds under wires, the data indicate that power line collisions are the single greatest documented source of mortality for Newell's Shearwaters and Hawaiian Petrels on Kaua'i and are having population level effects. Working with funding from the Kaua'i Island Utility Co-operative, the team has been developing a number of ways to reduce these collisions, including the creation of laser fences at key collision hot spots (to create a visual barrier for birds to fly over power lines) as well as looking at bird diverters, removal of the top power lines and the potential for relocation or realignment of existing lines. In 2018, we also began testing the use of diverters that have a blinking LED light to aid birds in wire detection in complete darkness.

Jay Penniman, Jenni Learned, Martin Frye, Puakea Mo'okini-Oliveira, and Karla Trigueros of Maui Nui Seabird Recovery Project (MNSRP) continue to search for and monitor burrows, and provide predator control for Hawaiian petrel on leeward Haleakala, Maui. Burrow counts have increased from 8 in 2014 to 55 this year. Reproductive success has increased from zero in 2014 to 50% in 2017. Since completion of an ungulate exclusion fence in 2014, assessment of revegetation has been performed annually. Work is ongoing to identify potential seabird colony restoration sites above the predicted sea level rise throughout the high Hawaiian Islands. MNSRP staff have identified four sites on Maui with potential for community engagement in ecological restoration within predator proof fences. Invasive weeds and mammalian predators must be removed so that coastal strand native

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Lehua Islet fieldwork. Photo credit: André Raine

vegetation can be reintroduced, seabirds can be provided safe breeding areas, and local people can have access to plant material and traditional sites for cultural practice. At Ho'okipa, one such potential site, restoration has begun with weed removal and out-planting of native coastal strand habitat plants. On Molokai, MNSRP is partnering with The Nature Conservancy in managing the Mo'omomi Wedge-tailed Shearwater colony and with the Molokai Land Trust at their Mokio Preserve to monitor for Wedge-tailed Shearwater, Band-rumped Storm-petrel, and Bulwer's Petrel. At Mokio, American Bird Conservancy is also a partner in a social attraction project for Laysan Albatross (*Phoebastria immutabilis*). Decoys and acoustic playback of the species calls were deployed last year and a visiting bird was recorded on a wildlife camera set at the site within a week of deployment. **Fern Duvall** (DOFAW) initiated a mark recapture study of Wedge-tailed Shearwaters in Maui Nui in 1997. MNSRP continues this project and staff travelled to Oahu this year to train graduate student, **Brooke Friswold**, and her lab mates to capture and band Wedge-tailed Shearwaters there for her study of light distraction and seabird fallout on leeward Oahu. On the islet of Molokini, where Wedge-tailed Shearwaters are

banded as chicks each fall, four acoustic monitors were deployed to listen for night attending species, Bulwer's Petrel and Band-rumped Storm-petrel. With U.S. Geological Survey (USGS) staff, **Josh Adams** and **Emma Kelsey**, MNSRP initiated the Maui Nui portion of an update to the Hawai'i Seabird Colony Atlas. Compilation of all historical data has begun, working from **Bob** and **Peter Pyle's**, Birds of the Hawaiian Islands, **Craig Harrison's**, Seabirds of the Hawaiian Islands, and **Stuart Fefer's**, Catalogue of Hawaiian Seabird Colonies. A boat survey circumnavigating Molokai and the deployment of 11 automated acoustic monitors on 6 offshore islets and three montane wet forest sites were the first steps in this multi-year effort. The wet forest acoustic monitors are placed to listen for Hawaiian Petrel, Newell's Shearwater, Band-rumped Storm-petrel, Bulwer's Petrel and the, hopefully not extinct, Molokai Thrush (*Oloma'o*, *Myadestes lanaiensis*). MNSRP outreach staff, **Emily Severson** and **Nancy Taylor** continue to lead efforts in Maui County to address light pollution that causes seabird fallout, especially during the fall fledging of Hawaiian Petrels and Wedge-tailed Shearwaters. Effective communication with the county council and the mayoral candidates to stimulate action to update

the Outdoor Lighting Ordinance to require minimal short wave light (<500 nm) in all nighttime lighting in the county as well as standard methods to minimize light trespass continues to be a challenge. MNSRP partners with astronomers, turtle biologists, and near shore, coral reef community biologists in these efforts. Big shout out to the Westin Ka'anapali for eliminating their mercury vapor lights that used to shine directly out to sea after hearing MNSRP's pleas for dark sky values.

Pacific Rim Conservation (PRC) has continued to expand upon their "no net loss" program where the goal is to create equal amounts of predator-free high island habitat to match what is currently being lost to erosion and sea level rise in the Northwestern Hawaiian Islands. In 2018, 25 Black-footed Albatrosses (*Phoebastria nigripes*, BFAL), 53 Bonin Petrels (*Pterodroma hypoleuca*, BOPE) and 25 Tristram's Storm-petrel (*Oceanodroma tristrami*, TRSP) chicks from Papahānaumokuākea Marine National Monument were translocated by ship to James Campbell National Wildlife Refuge on Oahu. The birds were placed in a predator exclusion fence where the PRC team of biologists raised them on a diet of fish and squid slurry, and closely monitored their health and growth. Fledging success was 97% (100/103) overall, including 88% for BFAL (22/25), 100% for BOPE (53/53) and 100% for TRSP. This is the second year of BFAL translocations at this site and the first year of BOPE and TRSP translocations. Three years of Laysan Albatross (LAAL) translocations took place at this site from 2015 - 2017, and the first returning translocated chick, raised in 2015, was resighted two different times within the predator exclusion fence this year. PRC continues to do a variety of seabird monitoring surveys across Hawai'i and the Pacific as well as working on Newell's Shearwater and Hawaiian Petrel translocations on Kaua'i.

The Pacific Missile Range Facility (PMRF) Natural Resources (NR) Program team consists of two Wildlife

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Field Biologists and two Predator Control Biologists hired through a cooperative agreement between the US Navy and the Research Corporation of the University of Hawai‘i. The positions are supervised by **Jessi Hallman Behnke**, Installation Environmental Program Director (IEPD), and **Rachel Herring**, on-site PMRF Natural Resources Manager (NRM). The PMRF NR Program manages seabirds at three PMRF sites located on the island of Kaua‘i: 1) Barking Sands on the Mana Plain, 2) Makaha Ridge Tracking Station, and 3) a communications support facility near Koke‘e State Park. Predator control for feral cats, rats, and dogs is performed at all three of these sites in an effort to protect native species. PMRF Barking Sands supports an active airfield used mainly for training by various government agencies. The Bird Aircraft Strike Hazard (BASH) wildlife management program is supported by **Katherine Rubiano** (Wildlife Biologist, U.S. Department of Agriculture-Wildlife Services [USDA-WS]), and **Peter Silva** (USDA-WS Technician). Naval Facilities Engineering Command Pacific manages the contracting for annual aerial seabird surveys of Ka‘ula Rock. These surveys are performed using high resolution imagery and an algorithm to identify Pacific seabird species, then verified by a human observer.

Although no endangered seabird nesting colonies occur at Pacific Missile Range Facility (PMRF) sites on Kaua‘i, Newell’s Shearwater, Hawaiian Petrel, and Band-rumped Storm-petrel transit from the ocean to their montane nesting colonies near all three sites. To avoid seabird “fallout” associated with lighting attraction, the PMRF Natural Resources Manager (NRM) and Installation Environmental Program Director (IEPD) coordinate the PMRF Dark Skies Program in which all non-essential lighting is turned off during the fledging season of the three previously listed species. Lighting necessary for night operations is approved by the NRM, IEPD, and

PMRF Executive Officer through a waiver process. Additionally, lighting inspections of the base are conducted weekly, ground searches are performed in high-risk areas for downed seabirds, and PMRF houses a seabird aid station for Save Our Shearwaters, the island’s sole seabird rehabilitation clinic, that is checked daily. In 2018, night-time surveys were performed for transiting adults of the three species listed above at the PMRF Koke‘e Site C from 1 May - 1 June and 1 July - 15 September. Using standard operating procedures modelled after the Kaua‘i Endangered Seabird Recovery Project’s Underline Monitoring Program methodology, observers monitor two communication towers at the site for seabird strikes using a high-powered infrared light and night vision goggles for 2.5 hours, 30 minutes after sunset, and three hours before sunrise for 2.5 hours. In conjunction with these surveys, the towers are monitored for strikes using SM4 song meter automated recording units. Lastly, the Navy submitted a proposal through the Navy Readiness and Environmental Protection Integration Program to support a proactive conservation initiative between the U.S. Navy, USFWS, and the National Fish and Wildlife Foundation (NFWF) for the conservation of Newell’s Shearwater. The proposal was approved in late 2018 and planning is currently underway for \$1 million in Navy funds to be transferred to a NFWF account and be used to fund a largescale predator control project which will benefit the seabirds and numerous other native species.

PMRF Barking Sands supports three colonies of Wedge-tailed Shearwater (WTSH). One colony is monitored for mortalities weekly and predator control is performed, along with fencing, signs and protective A-frame covers are used to prevent the crushing of burrows. To help reduce BASH risk to pilots and WTSH, USDA-WS manages the colony within the airfield operating area. In late October 2017, WTSH population surveys were conducted for the first

time in a decade at the south airfield and beach cottages colonies by counting burrows and WTSH chicks.

PMRF is home to a colony of Laysan Albatross (LAAL) who breed within the airfield operating area and northward ending at the Kaua‘i Test Facility run by Sandia Laboratories. As LAAL are a large seabird species and at high risk of striking aircraft, USDA-WS personnel survey for LAAL nests and adults daily during the breeding season. Nests are reported to the field biologists who respond to collect data on the nest and collect the egg for incubation on-site. In 2017/2018, the annual Laysan Albatross Egg Swap program was continued in which PMRF NR works with the State Department of Fish and Wildlife, PRC, Kaua‘i Albatross Network, and other partners to swap fertile LAAL eggs laid at PMRF with infertile eggs in nests on the north shore of the island within predator managed colonies. In this way, the LAAL population is discouraged from growing in the dangerous area of the PMRF airfield and bolstered far away on the north side of the island. Adult LAAL are captured by USDA-WS personnel during airfield operating hours and either kept in large crates until they are released at the south boundary of base after the airfield closes, or driven to private properties on the north shore of Kaua‘i. The goal of adult LAAL relocation is to encourage the birds to find an alternative nesting location, therefore the effort occurs two months into the season, from January-May, when non-breeders are present at the colony.

Linda Elliott, Patrick Hogan, and Alexis Wessels reported on the work being conducted by the Hawai‘i Wildlife Center (HWC). On the island of Hawai‘i, HWC’s avian and bat hospital has had 14 species of seabirds from throughout the state in care so far in 2018, including all three species of boobies at the same time: Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), and Red-footed Booby (*Sula sula*) including an adult brown phase, and two species of albatross, Laysan Albatross and

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Black-footed Albatross. The species of seabirds that have been in larger numbers this year to date have been: orphaned White Terns (*Gygis alba*), and Wedge-tailed Shearwater chicks, in care due to displacement from storm surge and public rescues. On O‘ahu, HWC is partnering with DOFAW for a second year of the O‘ahu Seabird Aid project for response to downed seabirds, mainly affecting Wedge-tailed Shearwaters. Last year approximately 250 Wedge-tailed Shearwaters were picked up as part of the response program. HWC will be providing a stabilization site in partnership with the Honolulu Zoo, first responder training programs in partnership with DOFAW, and rehabilitation services at the main HWC wildlife hospital. Other organizations including James Campbell National Wildlife Refuge, local veterinary clinics, humane society, Sea Life Park and community volunteers are providing drop-off locations, transportation and release assistance. HWC is also partnering with DOFAW, the Honolulu Zoo, and USFWS for the September 2018 kick-off of the soft release project for White Terns. This project fills the need for the supplemental feeding and monitoring of orphaned juvenile White Terns as they fledge.

HWC also provided reports on their work on Maui and Lanai. On Maui, HWC provides rehabilitative services for downed seabirds transferred by the Maui Nui Seabird Recovery Project. Seabird species include: Hawaiian Petrel, Leach’s Storm Petrel (*Oceanodroma leucorhoa*), White-tailed Tropicbird (*Phaethon lepturus*) and Wedge-tailed Shearwater. On Lanai, HWC in partnership with Pūlama Lāna‘i, responds to downed seabirds for stabilization and rehabilitation. Seabird species include: Hawaiian Petrel and White-tailed Tropicbird.

During ongoing small-boat surveys for cetaceans around the main Hawaiian Islands, **Robin Baird** (Cascadia Research Collective) has been photographically documenting petrels and other unusual seabirds and



Mokuaee Islet fieldwork. Photo credit: André Raine

tallying numbers of all seabird species. Field efforts have been undertaken around all the main Hawaiian Islands and are typically two-three week long surveys off one island area at a time, spread throughout the year. This is a collaborative effort with **Peter Pyle** of the Institute for Bird Populations.

Josh Adams and **Emma Kelsey** (USGS), in collaboration with **Jay Penniman**, **Jenni Learned**, **Puakea Mo‘okini-Oliveira**, and **Martin Frye** (Maui Nui Seabird Recovery Project), **Hannah Nevins** (American Bird Conservancy), **Butch Haase** (Molokai Land Trust) and with support from **David Pereksta** (Bureau of Ocean Energy Management) initiated boat-based as well as acoustic surveys of Molokai to inform a new seabird colony atlas of the Main Hawaiian Islands.

NON-PACIFIC UNITED STATES

Compiled by **Samantha Richman**

Joanna Burger and **Michael Gochfeld** (Rutgers University) continued their studies of colony numbers, reproductive success, habitat use, and heavy metal levels in colonial birds nesting in Barnegat Bay, New Jersey. Since the 1970s, lead and cadmium

levels have declined in both eggs and feathers of fledglings in Common Terns (*Sterna hirundo*), Black Skimmers (*Rynchops niger*), several gulls, and egrets. However, mercury levels have varied markedly, but not declined. Since 1975, the number of colonies and nesting pairs has also declined for all species, except Great Egrets (*Egretta alba*) and Great Black-backed Gull (*Larus marinus*). During this period, several colony sites used in the 1970s disappeared, and many others became too low for birds to nest successfully; this change was due to sea level rise and increases in severe storms and flooding during the nesting season. World-wide data shows that sea level rise is highest in the northeastern U.S. Atlantic coast compared to other areas. The continued decline in the suitability of nesting islands in Barnegat Bay will likely lead to further declines in population and reproductive success. Data from 1970s to 2016 were analyzed and summarized in Burger and Gochfeld (2016) *Habitat, Population Dynamics and Metal Levels in Colonial Waterbirds: A Food Chain Approach* (CRC Press). The book covers population levels and heavy metal levels in bays and estuaries from Chesapeake Bay to Boston Harbor.

Joanna Burger (Rutgers University) has been working on migratory

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and intertidal foraging behavior of Red Knots (*Calidris canutus rufa*) in Delaware Bay, with **Larry Niles** (Conserve Wildlife of New Jersey), **Mandy Dey** (NJ Endangered and Nongame Species Program), and others. Her studies on use of the intertidal zone by knots and other shorebirds has shown that they are foraging along the tide line at high tide, but move out into the mudflats to forage during low tide. Although some remain in each tidal segment, some shorebirds move along with the tide, foraging farther and farther from shore. Their studies with migratory behavior have included placement of light-sensitive geolocators on knots to examine stopover areas, wintering sites, non-stop flights (distance and times), and incubation behavior. With **David Mizrahi** and **Nellie Tsipoura** (NJ Audubon), **Joanna** has been examining the levels of heavy metal in feathers and blood of shorebirds on wintering sites and on some stopover sites. For species examined in Delaware Bay, New Jersey, there were significant temporal trends in some species for some metals, but not for others. Except for selenium, measured metal levels were well below the effects levels. All these studies are on-going, including work in New Jersey, Suriname, and Brazil.

Jeff Spendelow (U.S. Geological Survey [USGS] Patuxent Wildlife Research Center, MD) coordinates cooperative research on the metapopulation dynamics and ecology of the endangered northwest Atlantic breeding population of Roseate Terns (*Sterna dougallii*). After ~35 years of concentrating on colony-site research in the Massachusetts-New York-Connecticut area, since 2011 he has been focusing on temporal and geographic variation in the use of staging sites in the “Cape [Cod] & Islands” area of Massachusetts by Hatch Year (HY) and adult ROSTs (especially non-breeding adults) given 3-character plastic field-readable (PFR) bands at 12 colony sites spanning the entire breeding range from Connecticut to Nova Scotia. Funding from the Cape Cod National Seashore

in 2014 and 2015 supported both the long-term “variation in staging site use” work that **Jeff** has been doing and two M.Sc. projects by **Melissa Althouse** (State University of New York College of Environmental Science and Forestry) and **Kayla Davis** (Virginia Polytechnic Institute and State University). **Melissa** has had two manuscripts either published or accepted for publication and **Kayla** has two undergoing review based on chapters of their respective theses. **Jeff** was sole or senior author on three other manuscripts in 2018 and while he will be retiring on 31 December 2018, he intends to continue writing more manuscripts (and doing more fieldwork) in the future as an “emeritus scientist”.

There was no USGS funding for **Jeff**’s fieldwork in 2018, so instead he took a vacation and spent 57 days from 25 July to 22 September birdwatching on Cape Cod where he had a more than 50% increase in “total daily identifications of terns with PFRs” over his 2017 results. **Jeff** was joined in his efforts for three weeks in August by **Catherine Neal** and **Ian Putnam** and for one week in September by **Grace Cormons** from the American Museum of Natural History Great Gull Island Project’s Roseate Tern Team. **Jeff** has not received data from all of his cooperators yet, but a preliminary look at the data received as of 30 September 2018 indicates that after the major changes in the distribution of staging terns seen in 2017, things apparently returned “back to normal” in the use of staging sites on the outer and northern parts of Cape Cod in 2018.

Richard Veit has been working with **Lucinda Zawadzki** on vagrancy to North America by Lesser Black-backed Gulls (*Larus fuscus*), on climate effects upon Common (*Sterna hirundo*) and Roseate Terns in Massachusetts with **Lisa Manne** and **Ian Nisbet**, and of foraging and diet of Herring Gulls (*Larus argentatus*) with **Leslie Thorne** and **Matt Fuirst**. He is analyzing spatial co-occurrence of seabirds species around South Georgia in winter with **Samantha Monier** to see if

opportunities for local enhancement and facilitation have changed with changing climate.

Under the guidance of **Patrick Jodice** (USGS, South Carolina Cooperative Fish and Wildlife Research Unit [USGS SCCR], and Clemson University [CU]), research continued on seabirds in the Southeast U.S., the Gulf of Mexico, and the Caribbean. To assist the U.S. Fish and Wildlife Service (USFWS), Bureau of Ocean Energy Management (BOEM), state agencies, and the Gulf of Mexico Avian Monitoring Network in developing management plans and future research and monitoring efforts, **Juliet Lamb** (post-doctoral researcher, CU-SCCR), **Yvan Satgé** (research specialist, CU-SCCR), and **Patrick Jodice** studied colony-specific movement patterns, habitat use and risk at sea, foraging ecology, and biology in the Eastern Brown Pelican (*Pelecanus occidentalis carolinensis*) in the northern Gulf of Mexico. M.S. student **Rochelle Streker** (CU-SCCR) is currently addressing information gaps on the reproductive ecology of Brown Pelicans in Mobile Bay, Alabama. On the Atlantic coast, **Bradley Wilkinson** (PhD student, CU-SCCR) is assessing foraging ranges, movement patterns, and migration paths of Eastern Brown Pelican breeding in South Carolina.

Patrick Jodice, Lisa Ferguson (Director of Research and Conservation, The Wetlands Institute) and **Yvan Satgé**, created a Seabird Colony Registry and Atlas for the Southeastern United States (2003 - 2017) and delivered it to the USFWS. The Registry and Atlas are intended for use by local, state, and federal resource managers to aid in the development of regional conservation and management plans, and enhance understanding of species phenology and distribution. Ferguson, L.M., Y. Satgé, J. Tavano, and P.G.R. Jodice. 2018. Seabird colony registry and atlas for the Southeastern United States. Final Report for U.S. Fish and Wildlife Service. South Carolina Cooperative Fish and Wildlife Research Unit, Clemson, South Carolina.

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Roseate Tern. Photo credit: David Pereksta

Together with **Jeff Gleason** (USFWS) and **Chris Haney** (TerraMar LLC), **Yvan Satgé** (CU-SCCRU), and **Pamela Michael** (post-doctoral researcher CU-SCCRU), **Patrick Jodice** is conducting vessel-based surveys for pelagic seabirds in the northern Gulf of Mexico as part of the newly initiated Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPS, with funding from BOEM). In what is now the most extensive at-sea survey for seabirds in the Gulf, 14 surveys were conducted since 2017 (totaling more than 200 days at sea) using National Oceanic and Atmospheric Administration (NOAA) vessels to assess the abundance and distribution of birds utilizing the pelagic environment.

Yvan Satgé and **Patrick Jodice** are collaborating with **Ernst Rupp** (Grupo Jaragua) to track the provisioning trips of chick-rearing Black-capped Petrel (*Pterodroma hasitata*) breeding in the Dominican Republic (with funding from the Neotropical Bird Club). They are also conducting a diet study using a genetic analysis of fecal DNA (funding from BirdsCaribbean). Results on the foraging ecology of Black-capped Petrel will inform conservation plans for the species.

Patrick Jodice is also advising **Hannah Madden** (project leader,

Caribbean Netherlands Science Institute) on the study of the foraging and reproductive ecology of Red-billed Tropicbird (*Phaeton aethereus*) on Sint Eustatius, Caribbean Netherlands.

In 2017, **Pam Loring** (USFWS Region 5) and **Linda Welch** (Maine Coastal Islands National Wildlife Refuge), in collaboration with USFWS R5 Migratory Bird Program, BOEM, and the Avian Research and Conservation Institute, equipped five incubating Common Terns with 2-gram solar satellite tags. Teflon tape harnesses were used to attach the tags, and documented the birds flying more than 50 km to forage during the nesting season. Post breeding, all five terns staged on Cape Cod, with staging time varying from a few days to six weeks. Two of the terns had close encounters with multiple hurricanes, apparently flying straight through Hurricane Maria. All the terns flew to Venezuela, spent time in Suriname and French Guiana, before wintering in Brazil. Two of the transmitters continued tracking the birds on their return flight to Maine and throughout the nesting season. One transmitter continues tracking a tern for the second wintering season.

David Wiley, **Ken Powers** (NOAA Stellwagen Bank National Marine Sanctuary [SBNMS]), and **Linda**

Welch continued their satellite tracking work into 2018 marking the sixth consecutive year of following wintering Great Shearwaters (*Puffinus gravis*) in the Gulf of Maine. Annual variation in spatial use of the Gulf of Maine from 2013 - 2017 has now been evaluated and will be described in a future publication. Sand lance (*Ammodytes spp.*) were documented to be being taken by shearwaters and it appears that these forage fish provide an important link to the distribution of the birds. Information on molt and stable isotopes (i.e. feathers, exhaled gases, and blood) were also collected. Results from the combined shearwater tagging efforts in New Brunswick (**Rob Ronconi**), Maine (USFWS), and the SBNMS effort were recently published: Powers et. al 2017. Movements and Foraging Habits of Great Shearwater (*Puffinus gravis*) in the Gulf of Maine, *Marine Ecology Progress Series*, 574: 211-226.

Linda Welch is working with Boston University (BU), Long Island University, and the University of New England (UNE) to try and better understand foraging behavior and diet composition in Common and Arctic Terns, Atlantic Puffins (*Fratercula arctica*), and Great Shearwaters. Samples were collected from several tern and puffin breeding colonies in Maine to document the presence of specific forage fish in the seabirds' diet. Current monitoring efforts on the colonies indicate what species of fish are delivered to chicks, but information on the diet of adult seabirds is unknown. Shearwater samples were collected in Massachusetts during satellite tagging efforts with SBNMS. UNE found up to 12 species of forage fish in the 2017 samples and is currently analyzing the 2018 samples. BU and UNE are conducting the stable isotope analysis of blood and breath samples, as part of a larger effort to understand seabird and forage fish interactions throughout the Gulf of Maine.

Laura Bliss is continuing her Ph.D. with **Dr. Gail Davoren** at the University of Manitoba. Her Ph.D. work focuses on forage fish-seabird systems in Atlantic

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Canada. Laura is also working with her co-supervisor **Dr. Jen Zamon** exploring the spatial relationship between resident killer whales (*Orcinus orca*) and Common Murres (*Uria aalge*), and seasonal differences in Cassin's Auklet (*Ptychoramphus aleuticus*) distribution in the Northern California Current. For more information about **Laura**'s research, please visit <https://laurablissec.wordpress.com/> or <https://www.facebook.com/PlacentiaBayCapelinPredator/>.

LATIN AMERICA

Compiled by André F. Raine

Rigoberto Rosas-Luis (CONACYT-Tecnológico Nacional de México, Instituto Tecnológico de Chetumal) and **Enriqueta Velarde** (Instituto de Ciencias Marinas y Pesquerías, Universidad Veracruzana) are currently focused on a study entitled "Stable isotopes of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ and ecosystem models of seabirds of the Gulf of California." Their research focuses on an analysis of the trophic ecology of seabirds using stable isotopes of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$. The work concentrates on the central Gulf of California, where they are collecting feather samples of Elegant Terns (*Thalasseus elegans*) and Heermann's Gulls (*Larus heermanni*), and samples of muscle tissue of their prey in 2017 and 2018. Preliminary results showed that both species are using different feeding sources in the area, and that the contribution of each prey to the nutrition of seabirds is a factor that defines the use and consumption of prey. Isotope results of the analysis of prey demonstrated that small pelagic fishes, mainly northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), and chub mackerel (*Scomber japonicus*), are important feeding sources that favor the reproductive success of Elegant Terns and Heermann's Gulls in the central Gulf of California. On the other hand, the importance of seabirds in the ecosystem has been evaluated by

the creations of an Ecopath model for Elegant Terns and Heermann's Gulls. Ecopath models are tools that allow the inclusion of different groups in a single equation, changes can be assumed in a single group to evaluate the response of the system. Isotope values of C and N and the use of Ecopath models are the two methods that the team is implementing in the central Gulf of California. Results of this research will help to propose an ecosystem based management of prey and predators in the Gulf of California, and to consider the creation of no-take zones during the breeding season of seabirds in the Midriff Island Region of the Gulf of California.

Federico Méndez-Sánchez, Executive Director of the Grupo de Ecología y Conservación de Islas (GECI), reports on the continued work of GECI's Seabird Restoration Program on Mexican Islands, implementing social attraction techniques for three species of cormorants: Brandt's, Double-crested, and Pelagic (*Phalacrocorax penicillatus*, *P. auritus*, and *P. pelagicus*) on Coronado and Todos Santos; Black-footed and Laysan Albatross (*Phoebastria nigripes* and *P. immutabilis*, LAAL) on Guadalupe; LAAL also on Clarión; and Elegant and Royal Tern (*Thalasseus maximus*) on San Roque and Asuncion. In total, 1,725 decoys and 19 sound systems were deployed. For burrowing species, social attraction techniques targeted: Cassin's Auklet (*Ptychoramphus aleuticus*, CAAU) on Coronado, Todos Santos, San Martín, San Jerónimo, Natividad, San Benito, San Roque, and Asunción; Guadalupe Murrelet (*Synthliboramphus hypoleucus*) on San Benito; Black-vented Shearwater (*Puffinus opisthomelas*, BVSH) on Guadalupe and Natividad; Townsend's Shearwater (*Puffinus auricularis*, TOSH) on Socorro and Clarión; Leach's Storm-petrel (*Oceanodroma leucorhoa*) on Guadalupe and Ashy Storm-petrel (*O. homochroa*) on Coronado and Todos Santos. In total, 837 artificial burrows and 17 sound systems were deployed. To date, 22 recolonizations

have been recorded, for some of which social attraction techniques were key. For example, the Royal Tern was last recorded on San Roque 90 years ago and it has now finally returned to nest after 8 years of implementing social attraction techniques. Also, CAAU returned to all historical nesting sites. Furthermore, 12 new colonies of several species have been recorded becoming established on these islands, which recolonized naturally. Monitoring continued for seabird populations on islands in the Mexican Pacific through: (1) the use of geolocators on Guadalupe, Natividad, San Benito and Socorro for BVSH, TOSH and LAAL; (2) the deployment of Automatic Recording Units on Socorro; (3) the use of detection dogs for petrels and shearwaters on Guadalupe and Socorro; and (4) counts and censuses of nests and burrows on 12 islands. GECI's lead contact for all these activities is **Yuliana Bedolla-Guzmán**, Project Director for Marine Birds (yuliana.bedolla [at] islas.org.mx).

In 2017, **Gabriela De la Cruz Pino** (Universidad Veracruzana [UV]) was assistant as observer at sea of birds from Boca del Río coast and Jamapa River in Veracruz, under the direction of **Dr. Enriqueta Velarde** (Institute of Marine Sciences and Fisheries, UV). This monitoring was part of Hydrographic Monitoring of the Coasts of Veracruz project of Institute of Marine Sciences and Fisheries. Currently she is a MSc student in Marine Ecology and Fisheries of the same institute, where her thesis focuses on the reproductive strategies of Heermann's Gull on Rasa Island, Gulf of California, Mexico. This work is under direction of **Dr. Enriqueta Velarde** and **Dr. Ernesto Ruelas Inzunza** (Institute of Biotechnology and Applied Ecology). The goal of this study is to determinate how ringed individuals cope with El Niño Southern Oscillation effects during several breeding seasons.

Ryan Carle, Pablo Manriquez, Paola González, Tiare Varela, Héctor Gutiérrez, Guillermo de Rodt, Flora Rojas, Valentina Colodro, Verónica López, Michelle Hester, and Peter

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Hodum (all Oikonos Ecosystem Knowledge) continued their long-term population monitoring and conservation work on Pink-footed Shearwaters (PFSH, *Ardenna creatopus*) in the Juan Fernández Islands and Mocha Island, Chile. Work on this species began in 2002, and has since focused on reducing land-based and at-sea threats through several conservation initiatives, including colony restoration, predator-proof fencing, and light fallout monitoring and mitigation. They are also collaborating with Chilean agencies, including the Instituto de Fomento Pesquero and the Subsecretaria de la Pesca, to identify critical regions where Pink-footed shearwater foraging overlaps with purse seine fishing activities in Chilean waters. Oikonos also has a multi-year breeding season monitoring and conservation program for De Filippi's Petrel (*Pterodroma defilippiana*) in the Juan Fernández Islands. New programs in 2018-19 include working with experts in wildlife-human conflicts to assist with relationships involving chick-harvesting, deploying a new conservation fence to exclude cows and rabbits from a PFSH colony, and expanding governmental capacity for quantifying beached seabird mortality.

Carlos Valle reports on the Galapagos seabird monitoring program that was started several years ago. Last year the project focused on the Red-footed booby (*Sula sula*) nesting at Punta Pitt, San Cristobal Island. In July 2018, the population was sampled to obtain baseline information about stress hormone levels and a general health assessment. Samples and data collected from select birds include: hormonal traces extracted both from feathers and blood; heart rate; respiratory rate; body temperature; body weight; body condition; blood analysis involving a complete red and white cell count; and plasma biochemistry. The Red-footed Booby colony being studied may be exposed to visitors in the near future if the Galapagos National Park opens the area as a new visiting site. This research will provide the Park



Pink-footed Shearwater. Photo credit: David Pereksta

with baseline information as a way to monitor potential stress and health conditions. The research was done in collaboration between **Carlos Valle** and **Susana Cardenas** (Universidad San Francisco de Quito), **Greg Lewbart** and **Dianne Deresienski** (North Carolina State University), **Jane Christman** (University of Florida), and **Rafael Diaz** (Galapagos National Park).

Hannah Nevins, Seabird Program Director, American Bird Conservancy, is working with several species of conservation concern in the Americas including Endangered Black-capped Petrel (BCPE, *Pterodroma hasitata*) with members of the BCPE Working Group, including **Jennifer Wheeler** (Birds Caribbean), **Adam Brown** (Environmental Protection in the Caribbean), **Matthew McKown** (Conservation Metrics), **Ernst Rupp** (Grupo Jaragua), **Yvan Satgé** and **Pat Jodice** (Clemson State University), consultant **Kirsty Swinnerton**, and **Dean Demarest** (USFWS). Collectively, the group is planning strategies for the next 5-year action plan to focus on reducing impacts at known sites in Haiti and the Dominican Republic, identifying new sites for protection, and determining the impact of at-sea threats. **Hannah Nevins** also is working with a group of stakeholders to update the Action Plan for Critically Endangered

Waved Albatross (*Phoebastria irrorata*) to address threats on land and sea with **Kate Huyvaert** (Colorado State University), **Elisa Goya** (Peru), **Caroline Icaza** (Ministry of Environment, Ecuador), and bycatch expert **Nigel Brothers** (Humane Society International, Australia). The team plans to complete a report to the working groups for the Agreement on the Conservation of Albatrosses and Petrels early in 2019.

Dave Anderson at Wake Forest University and his group finished the 35th year of a study of ecology and life history of Nazca Boobies (*Sula granti*) in Galapagos. At the study site on Española Island, there are at any one time around 5,000 banded, mostly known-age adults with comprehensive histories. Presently the team is concentrating on questions involving age-related variation in foraging performance (grad student **Jenny Howard**), breeding success (grad student **Emily Tompkins**), and muscle contractile force (grad student **Erynn Rebholz**), incorporating environmental variability and individual effects. A major change in diet 20 years ago from principally Pacific sardines to principally flying fish (*Cheilopogon spp.*) is explaining important variation in many aspects of the bird's lives, and seems to be providing insights into their future under ocean warming.

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Dave and others are wrapping up a block of work on stress response and personality (grad student **Jacquelyn Grace**, now at Texas A & M). **Dave** also continues to collaborate with **Kate Huyvaert** (Colorado State University) on conservation biology of Waved Albatrosses.

CANADA

Compiled by Trudy Chatwin

WESTERN CANADA

Mark Hipfner (Environment and Climate Change Canada, Delta – Wildlife Research Division [ECCC Delta – WRD]) reports that summer 2018 marked the 25th year of operation of the Centre for Wildlife Ecology's seabird research and monitoring program on Triangle Island. The 2018 field crew consisted of **David Bradley** (Bird Studies Canada, Delta), **Amos Chow** (ECCC Delta – Canadian Wildlife Service [CWS]), **Nik Clyde** (ECCC Delta – WRD), **Alice Domalik** (ECCC Delta – WRD, and M.Sc. Candidate, Simon Fraser University [SFU], Burnaby), **Andrew Huang** (ECCC, Delta – CWS), **Kevin Kardynal** (ECCC, Saskatoon – WRD), **Mason King** (PhD Candidate, SFU, Burnaby), **Elsie Krebs** (ECCC, Delta – WRD), **Greg McLellan** (ECCC, Delta – CWS), **Megan Ross** (ECCC, Delta – WRD), and **Ken Wright** (ECCC, Delta – WRD), in addition to **Mark**. As in past years, the Triangle crew monitored breeding chronology, breeding success and nestling diet in Cassin's Auklet (*Ptychoramphus aleuticus*), Rhinoceros Auklet (*Cerorhinca monocerata*), and Black Oystercatcher (*Haemotopius bachmani*). The crew also took soil cores and collected vegetation and insect samples for stable isotope analysis for a project investigating the dynamic relationship between seabird populations and vegetation patterns on the island.

Research also continued on several other major Rhinoceros Auklet colonies in British Columbia (BC). ECCC – WRD visited Pine Island, Lucy Island,

and Cleland Island. The primary objective of this program, which was initiated in 2006, is to study the effects of oceanographic variation on multiple trophic levels – the diets of the auklets and of their major fish prey, Pacific sand lance (*Ammodytes personatus*) and Pacific herring (*Clupea pallasii*). They continue to collaborate on this research with researchers in Washington State, and with Fisheries and Oceans Canada in Nanaimo. The field crew for the BC portion of the work consisted of **Isabelle Cellier** (ECCC Delta – CWS), **Nik Clyde**, **Alice Domalik**, **Mark Hipfner**, **Agathe Lebeau** (ECCC Delta – CWS), and **Megan Ross**. While on the auklet colonies, they also deployed GPS tags on Rhinoceros Auklets for a study of at-sea distributions and habitat selection being led by **Alice Domalik**, whose MSc is co-supervised by **Mark Hipfner** and **David Green** (SFU, Burnaby); collected eggs and prey samples for a contaminants study being led by **Mason King**, whose PhD is co-supervised by **John Elliott** (ECCC Delta – Wildlife Toxicology Division) and **Tony Williams** (SFU, Burnaby); completed the seventh year of a project investigating the consumption of salmon (*Oncorhynchus spp.*) by seabirds in BC waters, in collaboration with **Strahan Tucker** (Department of Fisheries and Oceans Canada [DFO], Nanaimo – PBS); and completed the tenth year of a project investigating the ingestion of microfibres/microplastics by forage fish, in collaboration with **Moira Galbraith** (DFO, Sidney – Institute of Ocean Sciences).

Louise Blight (Procellaria Research & Consulting; University of Victoria [UVIC] School of Environmental Studies; and British Columbia Ministry of Environment and Climate Change Strategy) has embarked on a project with **Ed Kroc** (Department of Educational and Counselling Psychology, and Special Education, University of British Columbia [UBC]) and **Douglas Bertram** (ECCC – WRD) to study urban-nesting Glaucous-winged Gulls (*Larus glaucescens*) in the Canadian portion of the Salish Sea. This includes

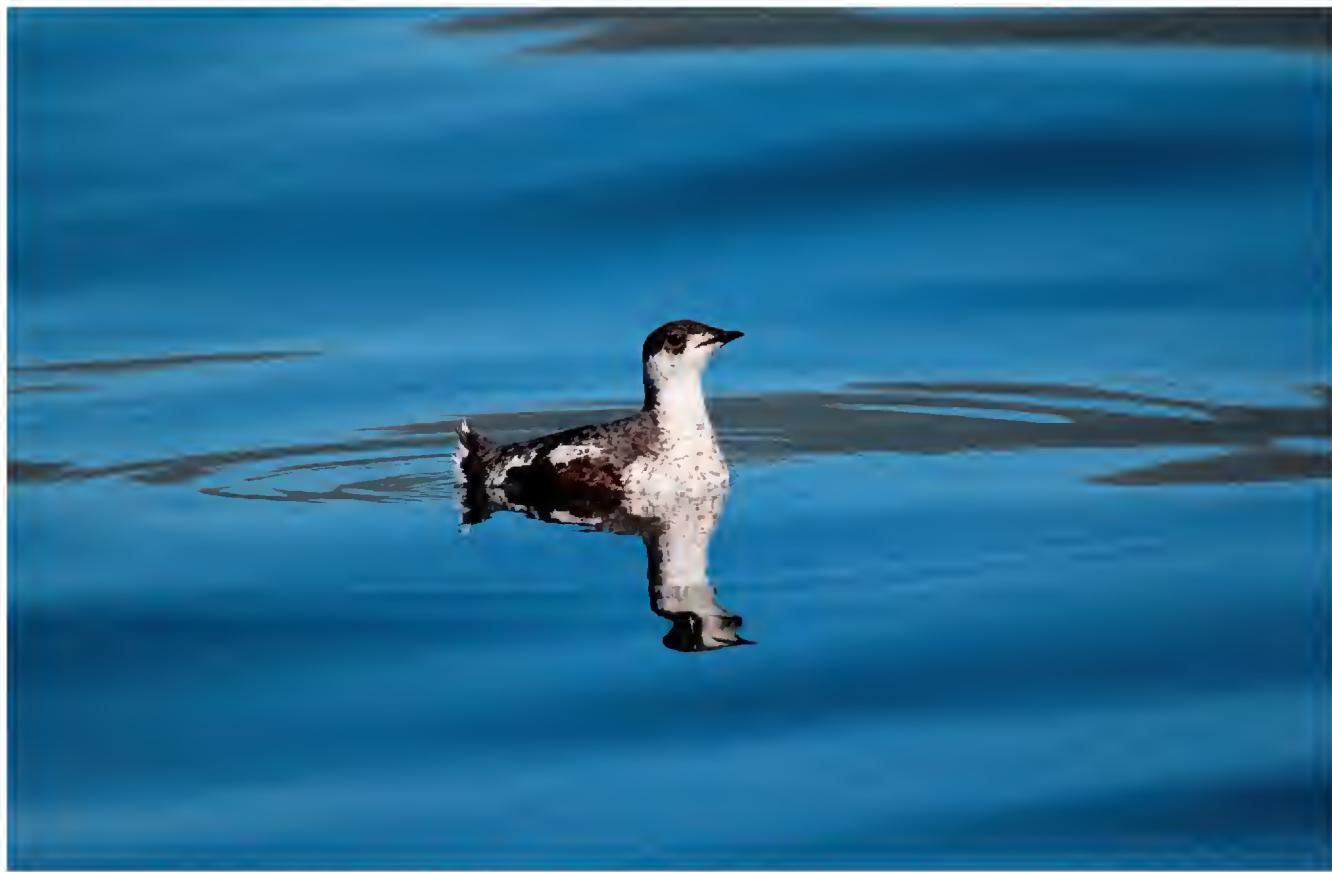
using drone-based imagery to census the population breeding in Victoria, BC.

Louise Waterhouse and **Jenna Cragg** of the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) in Nanaimo, BC completed a third year of testing the effectiveness of using automated recording units (ARUs) to sample the vocal activity of Marbled Murres (*Brachyramphus marmoratus*) small forest habitat patches. ARUs were deployed on Vancouver Island and Haida Gwaii to sample a range of harvest histories (extent of harvest and time since harvest). Audio-visual and radar surveys were conducted at each cluster of sites to compare with ARU recordings. A landscape-level spatial analysis was completed by **Lena Ware** (Vancouver Island University) to score metrics of habitat fragmentation for each study site. This research project aims to inform decision-making in British Columbia regarding the value of small patches in contributing to critical habitat for the Marbled Murrelet.

Bernard Schroeder and **Jonquil Crosby** (Bernard K. Schroeder Consulting [BKSC]) conducted a second season of Marbled Murrelet radar and concurrent audio-visual surveys for **Louise Waterhouse** (MFLNRORD). Studies are designed to compare Marbled Murrelet commuting behaviours observed on radar with audio-visual observations by field surveyors and audio data recorded on Automated Recording Units (ARUs). Surveys were conducted near ARUs in the Capilano watershed on the lower mainland of British Columbia and in the Klanawa, Sooke Lake and Tsitika watersheds of Vancouver Island.

Laurie Wilson (ECCC Delta – CWS) coordinated the Pacific CWS Seabird Colony Monitoring Program in 2018, revisiting permanent plots and assessing occupancy rates at the Ancient Murrelet (*Synthliboramphus antiquus*) and Cassin's Auklet colonies on Ramsay Island in the Gwaii Haanas National Park Reserve and Haida Heritage

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Marbled Murrelet. Photo credit: Jenna Cragg

Site, Haida Gwaii, BC. The second year of a pilot study was conducted to investigate how ARUs & trail cameras could augment CWS's long term monitoring of population trends of burrow-nesting seabirds. Field crew included **Laurie Wilson, Dan Shervill, Greg McClelland, Patrick O'Hara** (all ECCC Delta – CWS), **Glen Keddie** (ECCC – CWS contractor, Smithers, BC), and **Vivian Pattison** (UVIC).

Global Positioning System (GPS) tracking devices were deployed on incubating Ancient Murrelets on Ramsay Island. We tracked a single foraging trip for one bird in a mated pair. **Vivian Pattison** will analyze the tracklogs as part of her graduate work at UVIC. Specifically, she will determine how to identify Ancient Murrelet behaviour states from GPS track logs, use these logs to determine home range and potential foraging locations, and explore whether biophysical variables (such as bathymetry, sea surface height anomaly, and chlorophyll-a) correlate with the foraging locations.

Leach's Storm-petrels (*Oceanodroma leucorhoa*) and Fork-tailed Storm-petrels (*Oceanodroma furcata*) on Rock Islet were surveyed to determine current population estimates and occupancy rates. Rock Islet is one of the most historically important petrel colonies

on the east coast of Moresby Island. In general, little is known about the status of the petrel colonies along the BC Coast, as most have not been re-evaluated since the 1980s. Field crew included **Laurie Wilson, Greg McClelland, Glen Keddie, Vivian Pattison, Caroline Fox, and Megan Willie** (all ECCC Delta – CWS).

Finally, **Laurie Wilson** continues with her assessment of seabird bycatch in commercial salmon gillnet fisheries. Reports of bird entanglements from the Department of Fisheries and Oceans (DFO) test fisheries with observer programs and bycatch events reported by fishers will be tallied; these data will be used to derive seabird bycatch estimates.

Pat Baird (SFU and California State University) was on the local committee of the 2018 Ornithological Congress in Vancouver 20-26 August. She created two symposia for the Congress and organized conveners and keynote speakers:

Symposium #1.

- **Bruno Ens** (Sovon, Dutch Centre for Field Ornithology) and **Dr. Richard Fuller** (School of Biological Sciences, University of Queensland Australia), Co-conveners: "Loss of Tidal Wetlands Worldwide - Direct

Anthropogenic Effects and Sea Level Rise"

KEYNOTE SPEAKERS were:

- **Dr. Richard Fuller** (School of Biological Sciences, University of Queensland Australia): "Mud, Glorious Mud! Global Distribution and Conservation of Intertidal Wetlands"
- **Dr. Yvonne Verkuil** (International Wader Study Group): "The Collapse of Intertidal Wetlands in the Yellow Sea: A Crucial Habitat for Migratory Waterbirds"

Symposium #2.

- **Dr. Pat Baird and Stephanie Jones** (USFWS), Co-conveners: "DHA and EPA – Essential in physiology of birds for reproduction, migration, and homeostasis"

KEYNOTE SPEAKERS were:

- **Dr. Pat Baird**: "DHA and EPA – Essential in physiology of birds for reproduction, migration, and homeostasis"
- **Dr. Chris Guglielmo** (University of Western Ontario): "Do polyunsaturated fatty acids matter for bird migration?"

Pat and **Dave Moore** (Environment Canada) organized the 42nd annual meeting of The Waterbird Society held two days before the IOC. **Pat** and **Kyle Elliott** (McGill University) have put together a symposium on Seabird energetics for the Waterbird Society's annual meeting. <https://waterbirds.org>

When not organizing conferences, **Pat Baird** works on a global ecosystem project on phytoplankton, seabirds, and shorebirds as well as population ecology of Tufted Puffins (*Fratercula cirrhata*), terns (*Onychoprion aleutica*, *Sterna paradisea*, *Sternula antillarum*), and gulls (*Larus delawarensis*, *L. californicus*, *L. glaucescens*, *Rissa tridactyla*).

Pat Baird is Book Editor for Marine Ornithology (2012 - present), is on the Aleutian Tern Committee for PSG and on the Strategic Planning Committee for the Waterbird Society, where she just

finished a 3-year term as Councillor. She is also a Director of the British Columbia Section of The Wildlife Society. She is collaborating on seabird research with a number of scientists from the U.S. and Canada.

Alan Burger (UVIC and independent consultant) is mostly retired but continues some work on the Marbled Murrelet including contracts, reviews, conservation, and publishing. **Alan** is currently the President of the Federation of British Columbia Naturalists.

Trudy Chatwin (retired biologist with Province of British Columbia) carried on with Double-crested Cormorant (*Phalacrocorax auritus*) surveys in the Strait of Georgia (Canadian section of the Salish Sea). The purpose of the surveys is to contribute to understanding of Double-crested Cormorant populations and distribution across Western North America in relation to management decisions (especially in relation to cormorant control in the Columbia River estuary and bridge nesting sites in Vancouver). **Mark Drever** (CWS) and **Mason King** (PhD Candidate, SFU, Burnaby) surveyed the Second Narrows Bridge of Vancouver as one of the Pacific Flyway Council long-term monitoring sites and where proposed nesting closure may occur. Other Cormorant Counters included **Briony Penn**, **Jenna Cragg**, **Megan Wille**, **Marilyn Lambert**, **Alison Watt**, **Nancy Baron**, **Don Griffiths**, **John Elliott**, **Sandi Lee**, and **Peggy Sowden** (volunteers). Overall in 2018 we counted 543 active Double-crested Cormorant nests at four active colonies out of six locations surveyed in the Strait of Georgia, which compares to 610 nests in 6 colonies in 2014.

Monica Mather (Province of British Columbia) provided information on Marbled Murrelet Suitable Nesting Habitat in BC in 2018:

Suitable Marbled Murrelet nesting habitat is mapped across its range using the methods including Low-level Aerial Surveys, Air photo Interpretation and the BC Model habitat algorithm (Mather et. al 2010 <http://jem-online.org/forrex/index.php/jem/article/view/11>). The date

of habitat mapping varies from 2002–2017 and depletions of suitable habitat from forest harvesting are applied to the mapped habitat to 2017 to provide current suitable nesting habitat estimates. The most accurate mapping method is used for a given area; however, all mapping methods have some degree of inaccuracy. Updates to suitable nesting habitat mapping are ongoing.

In February 2018, the Province of British Columbia approved the BC Marbled Murrelet Implementation Plan. The plan outlines priority actions and timelines that represent the province's commitment to Marbled Murrelet nesting habitat management: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/recovery-planning/recovery-planning-documents/recovery-planning-documents>. The Plan sets a province-wide population objective to maintain 70% (or greater) of 2002 amounts of suitable nesting habitat on provincial Crown Land. To effectively implement habitat protection measures on provincial Crown lands, an updated spatial habitat and recovery threshold analysis was completed in June 2018. Habitat retention percentages and Minimum Habitat Thresholds (MHTs) for provincial Crown land have been revised for each of the seven Marbled Murrelet conservation regions in the province based on the results of the updated analysis.

Kerry Woo (ECCC – CWS) is responsible for recovery planning of marine birds listed as species-at-risk in the Pacific region, with a primary focus on Marbled Murrelet. In 2018, he continued to collaborate with **Doug Bertram** (ECCC) and **Cliff Robinson** (DFO) to support development of modelling and partial mapping of candidate marine critical habitat. Sea surveys and benthic grabs were conducted in Barkley Sound, Vancouver Island with **Bruce Evans** (vessel charter) and **Eric Gross** (ECCC – CWS). **Kerry** and **Eric** also conducted-seabird surveys from Sidney, BC to the northern tip of Vancouver Island in July. To fill

existing data gaps in seasonal coverage, **Kerry Woo** is working with **Caroline Fox** (ECCC – CWS) to coordinate and conduct at-sea bird surveys with charter vessels from November to March in the Salish Sea and Strait of Juan de Fuca.

Bernard Schroeder conducted Marbled Murrelet radar counts at five long-term population trend monitoring locations in the East Coast Vancouver Island Conservation Region of BC for **Kerry Woo**. **Jonquil Crosby** and **Dave Baird** (BKSC) provided audio-visual support radar surveys. Surveyed locations included: Lake Cowichan, Nanaimo Lake, Salmon River (at Kelsey Bay), Sooke Lake and Upper Campbell Lake.

Efforts to maintain radar monitoring coverage in British Columbia have allowed **Mark Drever** (ECCC Delta – CWS), **Murdoch McAllister** (UBC) and **Douglas Bertram** to update Marbled Murrelet coast-wide population trends for British Columbia to include recent data collected over the past 4 years in order to expand population trend analyses from 1996 to 2018 (analyses in progress).

Kerry Woo also supported work to publish background and guidance material related to Marbled Murrelet terrestrial nesting habitat assessment in British Columbia which includes a publication by **Alan Burger** in the Journal of Ecosystems & Management on ‘The Reliability and Application of Methods Used to Predict Suitable Nesting Habitat for Marbled Murrelets (18(1):1–18. <http://jem-online.org/index.php/jem/article/view/593/>)

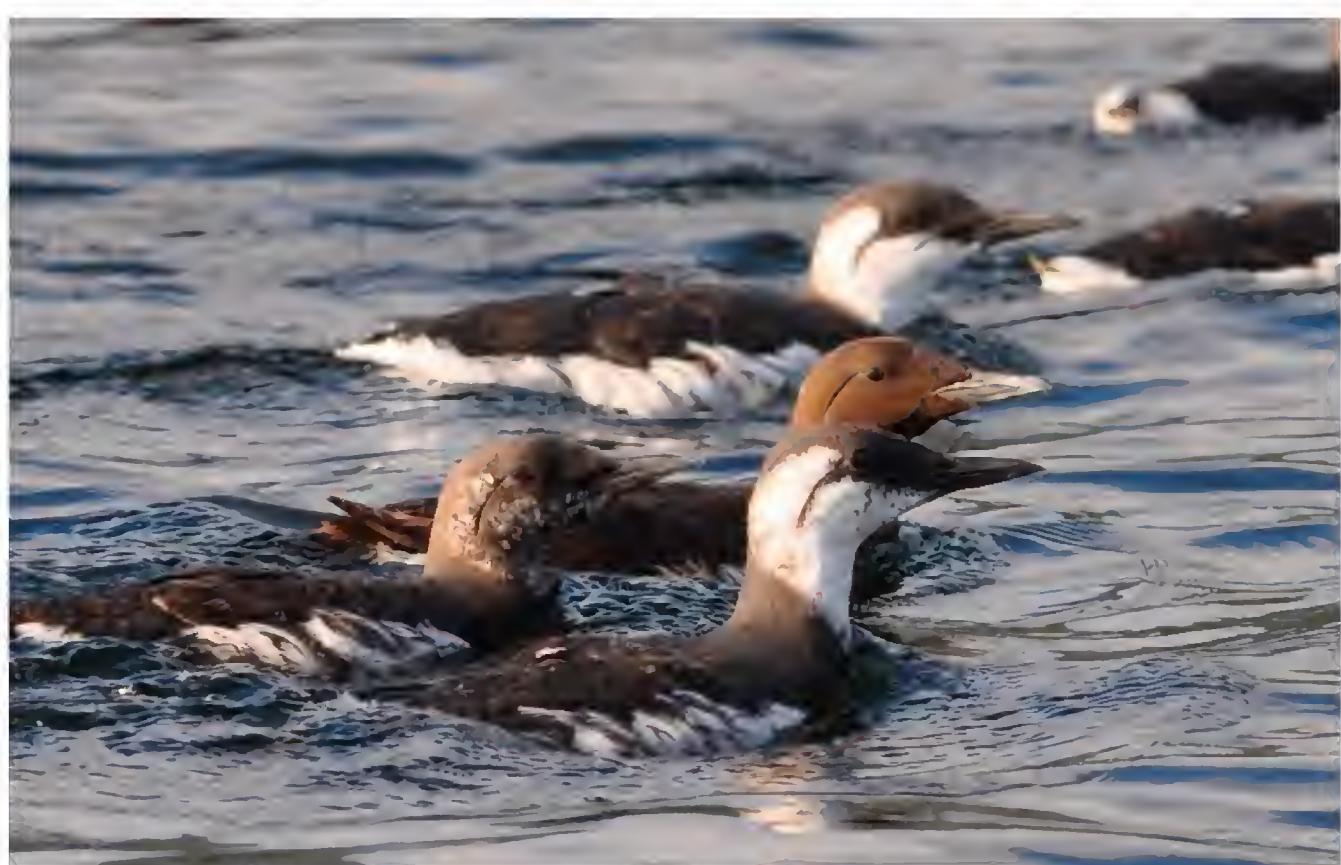
Bernard Schroeder, **Todd Manning** (Strategic Resource Solutions), **Paul Chytyk** (Yuni Environmental), and **Peter Berst** updated the document and training module for “Manning et al. 2018. Guidance and Tools to Support the Identification of Potential Marbled Murrelet Suitable Nesting Habitat. Canadian Wildlife Service Technical Report (Technical Report Series No. 536. 2018. Availability pending)” for **Kerry Woo** in anticipation of presenting a 2018 and/or 2019 training workshop.

Bernard, Todd and Ryan Murphy evaluated an Unmanned Aerial Vehicle (UAV) as a potential tool for Marbled Murrelet habitat assessment in the Tsitika valley and included results in the above-mentioned document and training module.

Douglas Bertram conducted year-round marine bird and forage fish surveys in the Southern Salish Sea to gauge threats associated with increased shipping, and contaminants (including microplastics) in oceans near urban areas. In July 2018, remote Central Coast Inlets were surveyed to help develop current baselines for coastal BC.

EASTERN CANADA

Dr. Gail Davoren and her students from the University of Manitoba; **Edward Jenkins, Julia Gulka, Laurie Maynard, Marissa Berard, and Kelsey Johnson**, continued collecting long-term at-sea survey data on the northeast Newfoundland coast. The purpose of this work is to correlate seabird and marine mammal density/distributional patterns with that of forage fish, specifically capelin (*Mallotus villosus*). Long-term monitoring of Atlantic Puffins (*Fratercula arctica*), Razorbills (*Alca torda*) and Common Murres (*Uria aalge*) continued with blood sampling for stable isotope analysis to investigate diet. They also investigated predation of breeding Common Murres by Herring Gull (*Larus argentatus*) and Great Black-backed Gull (*Larus marinus*) at an inshore and offshore colony. This work involved combining GPS tracking devices on breeding gulls and behavioral observations. Common Murres at both colonies were GPS tagged to examine inter-colony differences in foraging effort. A census of six inshore island colonies were conducted (with the Canadian Wildlife Service) to estimate numbers of breeding Leach's Storm-petrels (*Oceanodroma leucorhoa*), Atlantic Puffins, Razorbills, and Black Guillemots (*Cephus grylle*). Preliminary results suggest an increase in puffins and razorbills, while storm-petrel populations appear to be stable



Common Murres. Photo credit: Carita Bergman

when compared with historic census data.

ARCTIC CANADA

In summer 2018, **Kyle Elliott** (McGill University) and **Grant Gilchrist** (Environment and Climate Change Canada) continued work at Coats Island on Thick-billed Murres (*Uria lomvia*) and Glaucous Gulls (*Larus hyperboreus*). Alongside contractors **Sarah Poole** and **Sam Richards**, and Inuit field technicians **Josiah Nakoolak** and **Jupie Angootealuk**, were PhD student **Allison Patterson**, MSc student **Redha Tabet** and MSc student **Alyssa Eby**. This season was one of the latest years on record, 10 days later than 2017. We recorded a 37 year-old murre (banded as a chick in 1981), which we believe is a record for Thick-billed Murres, although there are many records of 40+ year-old auks, including Common Murres (*Uria aalge*).

ASIA & OCEANIA Compiled by Luke Einoder

ASIA

Yutaka Watanuki (Hokkaido University [HU], Japan) and post-doc researcher **Kentaro Kazama** (HU)

tracked a number of Black-tailed Gulls (*Larus crassirostris*), Slaty-backed Gulls (*L. schistisagus*), and Rhinoceros Auks (*Cerorhinca monocerata*) from Rishiri Island and Todoshima islet colony in Northern Hokkaido, using remotely downloaded Global Positioning System (GPS) data-loggers to map at-sea movements and gauge seabird sensitivity to offshore wind farms. This is the first field season of a three-year project aiming to inform wind energy development in northern Japan. Also, **Kentaro Kazama** and **Shizuku Hashimoto** (M.Sc. student, HU) examined direct and indirect effects of White-tailed Eagles (*Haliaeetus albicilla*) on Black-tailed Gulls breeding at both places.

Yutaka Watanuki and **Akiko Shoji** (HU) studied the bio-transport of pollutants from marine to terrestrial ecosystem by seabirds. Geolocator-tracked Rhinoceros Auks returning to their breeding colony on Teuri island were captured to retrieve the geolocator and collect blood and feathers for mercury analysis.

Yutaka Watanuki in collaboration with the Veterinary Institute of HU and Geochemical Institute of Tokyo University of Agriculture and Technology, studied the effects of plastic ingestion on 30 Streaked Shearwater

(*Calonectris leucomelas*) chicks at Awashima Island, Sea of Japan.

Bungo Nishizwa (Post-doctoral researcher, HU), **Haruka Hayashi** (M.Sc. student, HU), and **Nodoka Yamada** (M.Sc. student, HU) performed boat-based seabird surveys in the Northern Bering and Southern Arctic Sea as a part of the Arctic Marine Science program in collaboration with seabird scientists from Alaska. Biological net samples (zooplankton and forage fish), and seabird count data and are being processed in late 2018. Also, **Bungo Nishizwa** examined foraging behaviors of Black-footed Albatrosses (*Phoebastria nigripes*) breeding at Torishima, Izu Islands, Japan.

Yutaka Watanuki, Akiko Shoji, Tatsuro Kitagawa (M.Sc. student, HU) and **Jumpei Okado** (Ph.D. candidate, HU) continued a long-term program monitoring the diet and breeding of seabirds at Teuri Island in the Sea of Japan. Slaty-backed Gulls had exceptionally high breeding success, Black-tailed Gulls bred successfully following several years of failed breeding, and Rhinoceros Auklets had moderate breeding success after four years of failed breeding attempts. This suggests improved feeding conditions in the local marine ecosystem. Also, the Environmental Department of Japan continued a restoration program of Common Murre (*Uria aalge*) on Teuri Island. This year more than 50 breeding birds visited the site and 18 chicks fledged.

Kuniko Otsuki, Yutaka Nakamura, Yoshitaka Minowa, and Takashi Suzumegano (all Marine Bird Restoration Group, Japan), as well as **Darrell Whitworth** and **Mike Parker** (California Institute of Environmental Studies) performed surveys of Japanese Murrelets (*Synthliboramphus wumizusume*) at Biro Island, Miyazaki Prefecture, Japan. The project was funded by Suntory Group and the Lush Charity Pot. Three complementary survey techniques were used: (1) spotlight surveys on three concentric round-island transects and seven radial

transects to determine the number and density of murrelets congregating around Biro Island at night; (2) at-sea captures to examine the breeding status of murrelets in the congregation; and, (3) nest monitoring to determine timing of breeding. Surveys were conducted on 25 - 27 March, 4 - 5 and 7 April 2018. Thousands of murrelets were counted during spotlight surveys each night, indicating that Biro Island hosts the largest known Japanese Murrelet colony in the world. An annual report will be completed by 30 November 2018.

Masayoshi Takeishi (Marine Bird Restoration Group, Japan) and **Kuniko Otsuki**, as well as **Darrell Whitworth** and **Mike Parker** performed surveys from 1 - 3 April to assess the current status of Japanese Murrelets breeding at five islands (Oshima, Tsushima, Kainage, and North and South Kotsu) off Mugi-cho in Tokushima Prefecture, off the east coast of Shikoku, Japan. Nest searches, nocturnal at-sea spotlight surveys, and diurnal boat surveys were performed. Diurnal boat surveys and nocturnal spotlight surveys recorded hundreds of murrelets near the islands. Spotlight surveys indicated that murrelets likely nested on North Kotsu, South Kotsu, and Kainage islands. Nest searches were limited to Kainage Island where breeding was confirmed, but rodent feces and the carcass of an adult murrelet possibly depredated by rodents were also discovered.

Masayoshi Takeishi conducted follow-up surveys from 30 April to 2 May 2018 at these islands to collect more evidence of Japanese Murrelet breeding and possible rodent predation. During these surveys, murrelets were confirmed breeding on North and South Kotsu Islands and a murrelet family group (two adults and one recently hatched chick) was observed near the Kotsu Islands. Seven motion-sensitive cameras were deployed for a single night on Kainage Island to detect rodents. Images were recovered from four cameras, but none of the photographs indicated rodents were present. More surveys are urgently needed to better assess the presence or

absence of rodents on Kainage Island and the Kotsu Islands.

Ui Shimabukuro and **Akinori Takahashi** (National Institute of Polar Research, Japan) deployed geolocators in May and June on Rhinoceros Auklets at Teuri Island, Hokkaido, Japan, to study year-round movements. This five-year project started in the summer of 2015 and follows a previous study on migration of these auklets (Takahashi et al. 2015. *Marine Ecology Progress Series*). This project will examine how individual variation in migratory routes and activities associate with variation in diet (via stable isotope analysis) and stress levels (via feather corticosterone measurements).

Shota Tsukamoto (M.Sc. student, HU) examined diets and foraging behaviors of Common Murre, Thick-billed Murre (*U. lomvia*), Parakeet Auklet (*Aethia psittacula*), Crested Auklet (*A. cristatella*), and Least Auklet (*A. pusilla*) breeding at St. Lawrence Island, Alaska collaborating with **Akinori Takahashi** (National Institute of Polar Research, Japan).

Miran Kim (Korea National Park Research Institute [KNPRI], South Korea) and colleagues from Tongyeong City, monitored breeding status of Black-tailed Gulls on Hongdo Island, Gyeongnam province, in the South Sea located 50 km from the mainland. Researchers investigated breeding phenology, and the influence of introduced predators and vegetation cover on breeding to gain a better understanding of the effect of environmental variation and climate change. **Miran Kim** and **Sang Hee Hong** (Korea Institute of Ocean Science and Technology) implemented the project “Monitoring the impacts of microplastic on seabirds in South Korea,” collecting samples from Hongdon Island.

Miran Kim, Mijin Hong, Ho Lee, Sang-moon Cho, and Hong-chul Park (KNPRI) attached GPS trackers to two Black-tailed Gulls on Dokdo Island, Geonnam province, in East Sea. Birds were tracked from 26 May during the breeding season to identify their foraging



Black-footed Albatross. Photo credit: André Raine

ranges and key foraging areas.

Yang-mo Kim (KNPRI), **Chang-uk Park** (KNPRI) and rangers from Dadohaehaesang National Park conducted colony restoration activities on Chilbaldo Island, Geonnam province, in the Yellow Sea, to conserve Swinhoe's Storm-petrels (*Oceanodroma monorhis*). Invasive plants were removed from around the breeding colony, including *Achyranthes japonica*, a plant with hook-shaped seeds which entangle birds. These activities have reduced petrel mortality.

Ki-Baek Nam and his team (Korea Institute of Ornithology, Kyung Hee University, South Korea) completed the seventh field season at the largest colony of Streaked Shearwaters (*Calonectris leucomelas*), in South Korea on Sasudo Island in the Yellow Sea. They have been monitoring this colony since 2012 to investigate breeding biology and population trends, and to track the at-sea movement of individuals using GPS and geolocating devices. In addition, molecular work commenced in 2018 to assess the genetic variation across colonies of South Korea and Japan, where ~90% of the world's population of Streaked Shearwaters breed.

Dr. Shuihua Chen (Zhejiang Museum of Natural History, China) in collaboration with **Dr. Daniel Roby**

(Oregon State University, USA) and **Dr. Stephen Kress** (Audubon Society, USA) implemented the 6th year of a restoration project of the critically endangered Chinese Crested Tern (*Thalasseus bernsteini*) at Jiushan Islands and Wuzhishan Islands in the Eastern China Sea. The project involves the use of a social attraction technique to attract Greater Crested Terns (*T. bergii*) to the restoration sites with the intention of then luring Chinese Crested Terns to the established colony. With close monitoring, data on breeding biology and threats were collected. In 2018, more than 9,000 Greater Crested Terns were attracted to the two modified breeding grounds and 3,500 chicks fledged at the end of the breeding season in August. A total of 77 Chinese Crested Terns also bred at the two sites, and at least 25 chicks fledged - the first time the total number of individuals (chicks and adults) of this very rare seabird has surpassed 100. In addition, a further 11 Chinese Crested Terns were recorded from Matsu and Penghu islands in Taiwan, and one unnamed island in South Korea.

Chung-Hang Hung (Ph.D. candidate, National Taiwan University [NTU], Taiwan) has been working under the supervision of Professor **Hsiao-Wei Yuan** (NTU) to monitor the population size and dynamics of the critically

endangered Chinese Crested Tern and Greater Crested Tern in the Matsu Islands, South China Sea. The Greater Crested Tern is poorly known, with breeding records in recent years from only three sites, one of which is the Matsu Islands. Analysis of breeding success data collected at the Matsu Islands colonies annually from 2004 to 2017 reveal a significant decline in Chinese Crested Tern. Key factors contributing to this decline are thought to be typhoons, as well as the abandonment of initial breeding by some terns and re-laying at another colony within the Matsu Islands, and subsequent effects on fledgling success and recruitment (Hung et al., in press).

Chung-Hang Hung and a team of volunteers from the Wild Bird Society of Taipei constructed a bird hide on Tiejian Island, one of eight islands of the Matsu Island Tern Refuge, a BirdLife International Important Bird Area.

The Chinese Wild Bird Federation (CWBF, BirdLife partner in Taiwan) has been involved in talks on the establishment of Marine Important Bird and Biodiversity Areas near sites already established as Important Bird and Biodiversity Areas in the Matsu Islands and Penghu Archipelago. These areas provide important breeding and feeding grounds for populations of Chinese Crested Tern, Greater Crested Tern, Bridled Tern (*Onychoprion anaethetus*), Black-naped Tern (*Sterna sumatrana*), Roseate Tern (*Sterna dougallii*), and Brown Noddy (*Anous stolidus*).

The Chinese Wild Bird Federation (CWBF) is also conducting a feasibility study on a project to attract Short-tailed Albatross (*Phoebastria albatrus*) to an island in their former range, Pengjia Island, north of Taiwan proper. As there are already populations on the nearby Diaoyutai Islands, the use of decoys and vocalizations are being explored to get the globally threatened species to return to previous breeding colonies. In the 1950's Pengjia Island used to be home to millions of breeding albatross every year.

OCEANIA

Luke Einoder (Research Fellow, Charles Darwin University, Australia) deployed 12 time-lapse cameras (Brinno, BCC100) on Sandy Island no. 2 (Garig Gunak Barlu National Park, Northern Territory, Australia) with the assistance of local rangers from the Parks and Wildlife Commission of the Northern Territory, to monitor laying and hatching success of Crested Terns (*Thalasseus bergii*). A scoping trip was also run to Seagull Island off the northern tip of the Tiwi Islands, with rangers from the Tiwi Land Council, and many thousands of near fledging chicks were observed. The colony will be included in 2019 monitoring efforts as it is reportedly the largest Crested Tern breeding colony in the world. In the absence of any regular monitoring of tropical seabirds in the Northern Territory, the current status of the seabird community in the region is largely unknown.

Stephanie Avery-Gomm (PhD student, University of Queensland, Australia) is continuing work on her thesis which examines historical patterns of global seabird populations and plastic ingestion. At the International Ornithological Union in Vancouver, **Stephanie** presented a new phylogenetically-informed analysis, which can be used to predict vulnerability of seabird species to plastic ingestion. This year, **Stephanie** and several others including **Jennifer Provencher** (Wildlife Heath, Canadian Wildlife Service, Canada) and **Stephanie Borrelle** (post-doctoral fellow, University of Toronto, Canada), established a Specialist Working Group for plastic pollution under the umbrella of the World Seabird Union. More information can be found at www.seabirds.net.

Rowan Mott (Monash University, Melbourne, Australia) is using existing monitoring, tracking, and stable isotope data to inform management decisions relating to boobies (*Sula leucogaster*, *S. dactylatra*, and *S. sula*), frigatebirds (*Fregata ariel* and *F. minor*), and tropicbirds (*Phaethon rubricauda*). This

work is an ongoing collaboration with **Rohan Clarke** (Monash University, Melbourne, Australia), making use of data collected at Ashmore Reef and Adele Island in the eastern Indian Ocean during 2013 - 2015 as a side project to **Rowan Mott**'s PhD research. The research aims to provide decision support for various programs such as the control of invasive tropical fire ants (*Solenopsis geminata*), restoration of nearby seabird colonies, and marine protected areas. Analysis has largely used spatial data to understand ecological processes relating to nest site choice and foraging ecology. Key findings include the viability of nest site-targeted ant baiting as a method to improve tropicbird breeding success, and the predicted presence of ample suitable foraging habitat at a candidate site for seabird restoration/re-introduction.

Anicee Lombal (PhD Student, University of Tasmania, Australia) is continuing work on her thesis on genetic divergence between colonies of Flesh-footed Shearwater (*Ardenna carneipes*) exhibiting different foraging strategies. **Anicee** sequenced one mitochondrial and seven nuclear DNA fragments for 148 individuals from Lord Howe Island, various colonies in New Zealand and colonies in south eastern Australia. Her study found a lack of gene flow between colonies indicating that populations have clearly experienced independent evolution for a long time, which may greatly affect long-term viability and persistence of the species within these regions. Molecular analysis of fisheries' bycatch individuals sampled in the Sea of Japan indicated that individuals from both western and eastern colonies were migrating through that area. This study was presented at the Pacific Seabird Group Meeting 2018 and was published in February 2018 (Lombal et al. 2018 Conservation Genetics 19:27–41).

ANTARCTICA

Peter Kappes is finishing a PhD with his adviser, **Katie Dugger**, at Oregon State University, investigating the reproductive ecology and population dynamics of Adélie Penguins (*Pygoscelis adeliae*) breeding on Ross Island, Antarctica. In November 2018 **Peter** will be starting a term position with **Dr. Shane Siers** at the U.S. Department of Agriculture - Wildlife Services - National Wildlife Research Center in Hilo, HI working on developing methods for eradicating and controlling invasive vertebrates.

EUROPE & AFRICA

Compiled by Ross Wanless

No reports were submitted for this region.

TREASURER'S REPORT FOR 2018

Kirsten Bixler

Pacific Seabird Group's Fiscal Year (FY) 2018 ran from 1 October 2017 to 30 September 2018. The FY 2018 budget was approved by the Executive Council on 22 March 2018. It is in the black by \$38,163.00 and this total does not include endowment fund gains. A total of \$25,317.03 was transferred from the endowment fund to the regular checking account to cover publication costs for Marine Ornithology and Pacific Seabirds incurred during FY2016, FY2017, and FY2018. A complete summary of financial accounts (incomes and expenditures) is provided below.

PSG completed a financial audit for the first time in 2012 and it was anticipated at the time, that audits would be completed every five years. PSG's accountant did not recommend an audit be completed on FY2017 financial accounting. This was in large part because the level of change within the organization within a five year period (i.e. as many as three treasurers) is so great that an audit would not provide the EXCO with assurance that financial accounting is complete and accurate for four of every five years. Instead, the EXCO voted to complete four quarterly internal financial statements each year beginning in FY2019. These statements require basic proofing by the accountant and provide confirmation to EXCO that accounting is up-to-date.

A bank account was opened for the Former Chairs Fund during FY2018 to facilitate fundraising from the Former Chairs. Project proposals will be selected for funding at the Former Chairs' meeting during PSG Annual Meetings.

Since PSG took over the production of Marine Ornithology (MO) in 2000, the publication has been owned and primarily funded by PSG. In recent years, finances for MO were separate from PSG but during FY2018, PSG took over financial accounting for the journal. Taxes were filed jointly beginning in FY2017. PSG plans to open a bank and PayPal account for use by MO during FY2019. Financial assets of MO are included in the list of financial accounts below.

Highlights of February 2018 to February 2019

- FY2018 budget approved
- FY2017 taxes filed
- Opened a Former Chairs Fund bank account
- Created a Former Chairs Fund donation button on the PSG website
- PSG membership rates increased
- FY2019 budget approved
- Refunded the PSG checking account with the amount spent on publications in FY2016, FY2017, and FY2018 from the endowment fund with approval from the endowment trustees
- Conducted a quarterly internal financial statements on PSG finances in January 2019
- Submitted FY2019 tax information to accountant

Tasks to be Completed February 2019 to February 2020

- Re-activate SAM.gov (System for Award Management) account for PSG
- Consider moving to accounts to new bank because First Hawaiian Bank has high fees and few branch locations
- Open bank and PayPal accounts for MO
- Complete charitable giving registration for PSG so can accept donations via Facebook
- Assist Election Committee with Treasurer candidates in 2020
- Update Treasurer's Handbook
- Create draft Document Retention Policy
- Create draft Reimbursement Policy

Financial Accounts

PSG maintains a number of accounts to allow the organization to fulfill its mission.

REGULAR CHECKING ACCOUNT

PSG policy requires 3 years' worth of unrestricted operating funds be kept in the checking account.

September 30, 2014	\$50,663.75
September 30, 2015	\$68,154.50
September 30, 2016	\$52,164.86
September 30, 2017	\$44,027.81
September 30, 2018	\$74,728.29

TREASURER'S REPORT FOR 2018

PAYPAL

A PayPal account is used to accept membership dues, annual meeting registration, and donations but are part of the general fund. Funds are transferred into and out of the PayPal account as needed (e.g. student award donation is transferred to the student travel fund account).

September 30, 2014	\$2,555.26
September 30, 2015	\$8,072.97
September 30, 2016	\$10,560.16
September 30, 2017	\$450.65
September 30, 2018	\$5,348.72

STUDENT TRAVEL FUND

The student travel fund is kept in a savings account and is restricted to student travel awards.

September 30, 2014	\$2,784.99
September 30, 2015	\$2,906.21
September 30, 2016	\$3,094.55
September 30, 2017	\$3,096.10
September 30, 2018	\$3,018.05

CRAIG HARRISON CONSERVATION FUND

The Conservation fund is kept in a savings account and are restricted funds.

September 30, 2014	\$3,342.88
September 30, 2015	\$6,507.23
September 30, 2016	\$7,235.43
September 30, 2017	\$8,114.31
September 30, 2018	\$7,114.94

FORMER CHAIRS FUND

The Former Chairs fund is kept in a savings account and is a restricted fund. \$2,500 of this fund is a loan from the regular checking account to avoid bank fees.

September 30, 2018	\$2,501.64
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ENDOWMENT FUND

Our Endowment funds are kept in a mutual fund managed by Neuberger and Berman and are restricted funds. A total of \$25,317.03 was transferred from the endowment fund to the regular checking account during the fiscal year.

September 30, 2014	\$206,824.23
September 30, 2015	\$181,268.22
September 30, 2016	\$200,190.51
September 30, 2017	\$237,195.93
September 30, 2018	\$240,467.22

MARINE ORNITHOLOGY

Pacific Seabird Group completed financial accounting for Marine Ornithology during FY2018. Total funds are held within bank and PayPal accounts are combined here.

September 30, 2018	\$14,476.34
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Total Assets as of September 30, 2014	\$266,909.15
Total Assets as of September 30, 2015	\$266,909.13
Total Assets as of September 30, 2016	\$273,245.50
Total Assets as of September 30, 2017	\$292,884.80
Total Assets as of September 30, 2018	\$347,655.20

TREASURER'S REPORT FOR 2018

FY18 ACTUAL INCOMES AND EXPENDITURES

A. INCOME	Budgeted	Actual (as of 9/30/2018)	Surplus/-Loss
<i>Unrestricted:</i>			
Membership (annual individual, student): ¹	\$10,500.00	\$11,724.26	\$1,224.26
General Fund Donations	\$5,000.00	\$3,655.10	-\$1,344.90
<i>Annual Meeting:</i>			
La Paz 2018	\$74,305.00	\$98,276.79	\$23,971.79
Student travel (<i>Restricted</i>)	\$4,377.69	\$4,783.26	\$405.57
Meeting sponsorships ²	\$50,000.00	\$58,586.22	\$8,586.22
<i>Restricted:</i>			
Publications ³	\$30,000.00	\$25,317.03	-\$4,682.97
Lifetime Memberships	\$3,800.00	\$3,840.00	\$40.00
Conservation Fund Donations	\$600.00	\$1,629.16	\$1,029.16
Former Chairs Fund ⁴	\$0.00	\$1.64	\$1.64
A. TOTAL INCOME:	\$178,582.69	\$207,813.46	\$29,230.77
B. EXPENSES: Administrative Operations	Budgeted	Actual (as of 9/30/2018)	Underspent/ -Overspent
Chairs Discretionary Fund	\$2,000.00	\$2,002.99	-\$2.99
Insurance premium	\$2,292.30	\$1,325.00	\$967.30
<i>Online Services:</i>			
Website / Email hosting	\$551.76	\$598.68	-\$46.92
Listserv	\$300.00	\$299.88	\$0.12
Survey Monkey	\$300.00	\$319.00	-\$19.00
QuickBooks online	\$323.40	\$765.00	-\$441.60
Website and maintenance services (Anne Francis)	\$2,300.00	\$512.00	\$1,788.00
<i>Operations:</i>			
Postage	\$50.00	\$11.93	\$38.07
Telephone	\$400.00	\$275.67	\$124.33
Office supplies	\$30.00	\$0.00	\$30.00
USPS PO Box Rental	\$100.00	\$0.00	\$100.00
<i>Professional services:</i>			
Accountant / Bookkeeper ⁵	\$6,000.00	\$1,047.12	\$4,952.88
Legal ⁶	\$1,000.00	\$1,000.00	\$0.00
<i>Service fees:</i>			
PayPal Fee	\$700.00	\$799.38	-\$99.38
RegOnline / Cvent Membership Fee ⁷	\$5,845.00	\$604.39	\$5,240.61
Bank Fees	\$450.00	\$985.28	-\$535.28
Government Registration Fees	\$50.00	\$50.00	\$0.00
B. TOTAL ADMINISTRATIVE OPERATIONS EXPENSES:⁸	\$22,692.46	\$10,596.32	\$12,096.14

TREASURER'S REPORT FOR 2018

FY18 ACTUAL INCOMES AND EXPENDITURES

C. EXPENSES: Society Services (<i>meetings, publications, support</i>)	Budgeted	Actual (as of 9/30/2018)	Underspent/ -Overspent
Annual Meeting: La Paz, Mexico			
Conference venue, food, etc. -- Local Committee's budget ⁹	\$68,588.00	\$99,569.47	-\$30,981.47
Cvent Meeting Fee ¹⁰	\$0.00	\$3,845.07	-\$3,845.07
Compilation of scientific program	\$0.00	\$0.00	\$0.00
Student travel ¹¹	\$3,200.00	\$5,207.55	-\$2,007.55
Student travel awards (from PSG General Fund and grants)	\$20,000.00	\$16,412.45	\$3,587.55
Foreign scientist travel (non-US / Canadian)	\$25,000.00	\$18,498.69	\$6,501.31
Early Career Scientist Awards	\$0.00	\$4,905.00	-\$4,905.00
Conservation grants	\$0.00	\$2,078.50	-\$2,078.50
Dues and Subscriptions:			
Ornithological Council	\$3,060.00	\$2,460.00	\$600.00
Publications:			
Marine Ornithology (layout, printing, mailings) ¹²	\$6,000.00	\$5,800.00	\$200.00
Pacific Seabirds (layout, editor, website)	\$1,500.00	\$0.00	\$1,500.00
InDesign Subscription	\$180.00	\$277.41	-\$97.41
C. TOTAL SOCIETY SERVICES EXPENSES:	\$127,528.00	\$159,054.14	-\$31,526.14
D. PSG BUDGET SUMMARY			
TOTAL INCOME (A)	\$178,582.69	\$207,813.46	\$29,230.77
TOTAL EXPENSES (B + C)	\$150,220.46	\$169,650.46	-\$19,430.00
RESULT: SURPLUS/-LOSS	\$28,362.23	\$38,163.00	\$9,800.77

¹ Life membership income is not included (restricted to the Endowment Fund)

² Includes \$5,000.00 for 2019 meeting

³ Funds for publications (Marine Ornithology and Pacific Seabirds) are derived from endowment fund. Funds were transferred to cover expenses incurred in FY2016, FY2017, and FY2018

⁴ New budget item. Former Chairs Fund created during FY2018

⁵ Does not include \$4,188.48 paid in FY2019 that incurred during FY2018

⁶ Legal fee for Code of Conduct review invoiced in FY2018

⁷ Includes membership related fees only. Cvent fees associated with the meeting are included in meeting expenses.

⁸ This is the amount for PSG's operating expenses

⁹ Includes \$3,461.08 for 2019 meeting paid in FY2018

¹⁰ Includes meeting related fees only. Cvent/RegOnline fees related to membership are included in administrative expenses.

¹¹ Student travel expense equal to amount of student travel income generated through silent auction in 2017 and donations through the 2018 meeting.

¹² Expense is honorarium for Marine Ornithology volunteers

PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

The Pacific Seabird Group publishes symposia and other works. PSG Symposia are occasionally held at Annual Meetings; those which have been published are listed below. Technical Reports prepared by PSG working groups are also listed. To order one of these PSG publications, please see instructions after each item. Abstracts of papers and posters given at PSG meetings are published annually. Abstracts for meetings of 1974 through 1993 appeared in the PSG Bulletin (Volumes 2-20); for meetings of 1994 through 2003, in Pacific Seabirds (Volumes 21-30); and for meetings of 1997 and later, at www.pacificseabirdgroup.org. PSG publishes the on-line bulletin Pacific Seabirds (www.pacificseabirdgroup.org) and the journal Marine Ornithology (www.marineornithology.org). Current and past issues of both journals are available online.

SYMPOSIA

SHOREBIRDS IN MARINE ENVIRONMENTS. Frank A. Pitelka (Editor). Proceedings of an International Symposium of the Pacific Seabird Group. Asilomar, California, January 1977. Published June 1979 in Studies in Avian Biology, Number 2. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

TROPICAL SEABIRD BIOLOGY. Ralph W. Schreiber (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Honolulu, Hawaii, December 1982. Published February 1984 in Studies in Avian Biology, Number 8. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

MARINE BIRDS: THEIR FEEDING ECOLOGY AND COMMERCIAL FISHERIES RELATIONSHIPS. David N. Nettleship, Gerald A. Sanger, and Paul F. Springer (Editors). Proceedings of an International Symposium of the Pacific Seabird Group, Seattle, Washington, January 1982. Published 1984 as Canadian Wildlife Service, Special Publication. Out of print; *available free of charge at* www.pacificseabirdgroup.org

THE USE OF NATURAL VS. MAN-MODIFIED WETLANDS BY SHOREBIRDS AND WATERBIRDS. R. Michael Erwin, Malcolm C. Coulter, and Howard L. Cogswell (Editors). Proceedings of an International Symposium at the first joint meeting of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Colonial Waterbirds 9(2), 1986. \$12.00. Order from: Ornithological Societies of North America, PO Box 1897, Lawrence, Kansas 66044; phone (800) 627-0629; no online orders.

ECOLOGY AND BEHAVIOR OF GULLS. Judith L. Hand, William E. Southern, and Kees Vermeer (Editors). Proceedings of an International Symposium of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Published June 1987 in Studies in Avian Biology, Number 10. \$18.50. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

AUKS AT SEA. Spencer G. Sealy (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published December 1990 in Studies in Avian Biology, Number 14. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

STATUS AND CONSERVATION OF THE MARBLED MURRELET IN NORTH AMERICA. Harry R. Carter and Michael L. Morrison (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published October 1992 in Proceedings of the Western Foundation of Vertebrate Zoology, Volume 5, Number 1. \$20.00. Available free of charge at www.pacificseabirdgroup.org

THE STATUS, ECOLOGY, AND CONSERVATION OF MARINE BIRDS OF THE NORTH PACIFIC. Kees Vermeer, Kenneth T. Briggs, Ken H. Morgan, and Douglas Siegel Causey (editors). Proceedings of a Symposium of the Pacific Seabird Group, Canadian Wildlife Service, and the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia, February 1990. Published 1993 as a Canadian Wildlife Service Special Publication, Catalog Number CW66-124 1993E. *Order free of charge from:* Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A OH3, Canada

PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

BIOLOGY OF MARBLED MURRELETS—INLAND AND AT SEA. S. Kim Nelson and Spencer G. Sealy (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Seattle, Washington, February 1993. Published 1995 in *Northwestern Naturalist*, Volume 76, Number 1. \$12.00. *Available free of charge at* www.pacificseabirdgroup.org

BEHAVIOUR AND ECOLOGY OF THE SEA DUCKS. Ian Goudie, Margaret R. Petersen and Gregory J. Robertson (editors). Proceedings of the Pacific Seabird Group Symposium, Victoria, British Columbia, 8-12 November 1995. A special publication compiled by the Canadian Wildlife Service for the Pacific Seabird Group. Published 1999 as Canadian Wildlife Service Occasional Paper number 100, catalog number CW69-1/100E. Order free of charge from: Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A OH3, Canada, or *available free of charge at* www.pacificseabirdgroup.org

SEABIRD BYCATCH: TRENDS, ROADBLOCKS AND SOLUTIONS. Edward F. Melvin and Julia K. Parrish (editors). Proceedings of an International Symposium of the Pacific Seabird Group, Blaine, Washington, 26-27 February 1999. Published 2001 by University of Alaska Sea Grant, Fairbanks, Alaska. Publication no. AK-SG-01-01. \$40.00. *Order from publisher.*

BIOLOGY, STATUS, AND CONSERVATION OF JAPANESE SEABIRDS. Yutaka Watanuki, Harry R. Carter, S. Kim Nelson and Koji Ono (conveners) and Nariko Oka (editor). Proceedings of an International Symposium of the Japanese Seabird Group and Pacific Seabird Group, Lihue, Hawaii, February 2001. Journal of the Yamashina Institute of Ornithology 33(2); Symposium (5 papers), pp 57-147, other papers pp. 148-213. In English with Japanese abstracts. \$75.00. *Order from PSG* - contact the Chair at Chair@pacificseabirdgroup.org

OIL AND CALIFORNIA'S SEABIRDS. Harry R. Carter (convener) and Anthony J. Gaston (editor). Proceedings of a Symposium of the Pacific Seabird Group, Santa Barbara, California, February 2002. Published 2003 in *Marine Ornithology* 31(1). *Available free of charge at* www.marineornithology.org

THE BIOLOGY AND CONSERVATION OF THE AMERICAN WHITE PELICAN. Daniel W. Anderson, D. Tommy King, and John Coulson (editors). Proceedings of a Symposium of the Pacific Seabird Group. *Waterbirds*, Volume 28. Special Publication 1, 2005. Published by the Waterbird Society. \$15.00. *Order from PSG* - contact the Chair at Chair@pacificseabirdgroup.org.

BIOLOGY AND CONSERVATION OF XANTUS'S MURRELET. Harry R. Carter, Spencer G. Sealy, Esther E. Burkett, and John F. Piatt (editors). Proceedings of a symposium of the Pacific Seabird Group, Portland, Oregon, January 2005. Published 2005 in *Marine Ornithology* 33(2):81-159. *Available free of charge at* www.marineornithology.org

SEABIRDS AS INDICATORS OF MARINE ECOSYSTEMS. John F. Piatt and William J. Sydeman (editors). Proceedings of an International Symposium of the Pacific Seabird Group, Girdwood, Alaska, February 2006. Published 2007 in *Marine Ecology Progress Series* Volume 352:199-309. *Available free of charge at* <http://www.int-res.com/abstracts/meps/v352/#theme>

THE SALISH SEA ECOSYSTEMS: STATUS AND IMPACTS OF CHANGES ON MARINE BIRDS. Scott Hatch (editor), Douglas F. Bertram, John L. Bower, and Patrick D. O'Hara (guest editors.) 2009. *Marine Ornithology*, Salish Sea Symposium Issue 37: 1-76. *Available free of charge at* <http://www.pacificseabirdgroup.org/publications/Hatch.etal.2008.pdf>

Information on presenting symposia: Pacific Seabird Group Symposia or Paper Sessions may be arranged by any member who is interested in a particular topic. Before planning a special session, refer to Meetings/Symposia Guidelines at www.pacificseabirdgroup.org; also contact the Scientific Program Chair for the annual meeting.

PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

TECHNICAL PUBLICATIONS

EXXON VALDEZ OIL SPILL SEABIRD RESTORATION WORKSHOP. Kenneth I. Warheit, Craig S. Harrison, and George J. Divoky (editors). Exxon Valdez Restoration Project Final Report, Restoration Project 95038. PSG Technical Publication Number 1. 1997. *Available free of charge at* www.pacificseabirdgroup.org

METHODS FOR SURVEYING MARBLED MURRELETS IN FORESTS: A REVISED PROTOCOL FOR LAND MANAGEMENT AND RESEARCH. Pacific Seabird Group, Marbled Murrelet Technical Committee. PSG Technical Publication Number 2. 2003. *Available free of charge at* www.pacificseabirdgroup.org

PACIFIC SEABIRD GROUP COMMITTEE COORDINATORS FOR 2018-2019

Committees do much of PSG's business, as well as the conservation work for which PSG is respected. The committees welcome (and need) information concerning their issues. Please contact one of these Coordinators with input, updates, to apply for a small grant (see PSG's website for eligibility), or if you wish to help a committee with its work.

AWARDS COMMITTEE

Kyra Mills, email: pastchair@pacificseabirdgroup.org; **Adrian Gall**, email: chair@pacificseabirdgroup.org; and **David Craig**, email: programchair@pacificseabirdgroup.org

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PSG COMMITTEE COORDINATORS FOR 2018-2019

KITTLITZ'S MURRELET TECHNICAL COMMITTEE

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SCRIPPS'S MURRELET AND GUADALUPE MURRELET TECHNICAL COMMITTEE

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PSG DELEGATE TO THE NORTH PACIFIC MARINE SCIENCE ORGANIZATION (PICES)

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PSG LIFE MEMBERS 2018

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Michael Fry	Daisuki Ochi	Jeff Williams

*deceased

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G. Vernon Byrd	Karl W. Kenyon*	John Warham*
Harry R. Carter*	James G. King	
John Cooper	Haruo Ogi	

*deceased

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Martin Raphael
Mark J. Rauzon
Gus B. Van Vliet
Enriqueta Velarde
Yutaka Watanuki
Lindsay C. Young

*deceased

MEMBERSHIP INFORMATION

MEMBERSHIP BENEFITS

Members receive the following benefits: announcements of meetings, reduced rates on conferences and some publications, subscription to the PSG listserv, and most importantly, the knowledge of contributing to the study and conservation of Pacific seabirds wherever they occur. Annual membership is for one calendar year and expires each year on 31 December. Lifetime memberships are also available. All Life member contributions are dedicated to PSG's Endowment Fund, a fund to support the publications of the PSG, principally *Marine Ornithology*.

MEMBERSHIP RATES

Individual membership: \$50 USD

Two-year individual membership: \$90 USD

Student membership: \$35 USD

Two-year student membership: \$55 USD

Life membership: \$1,500 USD (can be divided into 5 annual payments of \$300 USD)

TO JOIN OR RENEW MEMBERSHIP

To join the Pacific Group or renew your membership, please go to: <http://tiny.cc/psgmember>

To edit information on an existing membership, please follow the link above and login using the e-mail address that you used to renew your membership (which may be different from your mailing-list e-mail address).

If you have any questions, please notify our Membership Coordinator: membership@pacificseabirdgroup.org

The Membership Coordinator is responsible for maintaining the membership database, assisting members with updating their information, sending new member information to the listserv coordinator, and other member assistance as needed.

MEMBER RESOURCES

To subscribe to the Pacific Seabird Group Listserv, please go to: lists-psg.org/mailman/listinfo/pacificseabirds_lists-psg.org
For access to the Pacific Seabird Group mailing list, please contact the coordinator at: listserv@pacificseabirdgroup.org.

Connect with the Pacific Seabird Group through our Facebook page at: <https://www.facebook.com/PacificSeabirdGroup>
Follow PSG on: Twitter at: [http://twitter.com/#!/pacificseabirds](https://twitter.com/#!/pacificseabirds)

Instagram https://www.instagram.com/pacific_seabird_group/

PSG EXECUTIVE COUNCIL 2018

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Past Chair	Kyra Mills , email: pastchair@pacificseabirdgroup.org
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Vice-Chair for Conservation	Mark Rauzon , email: conservation@pacificseabirdgroup.org
Treasurer	Kirsten Bixler , email: treasurer@pacificseabirdgroup.org
Secretary	Jane Dolliver , email: secretary@pacificseabirdgroup.org

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Website Coordinator	Joanna Smith , email: communications@pacificseabirdgroup.org
Elections Coordinator	Katie O'Reilly , email: PSG_elections@pacificseabirdgroup.org